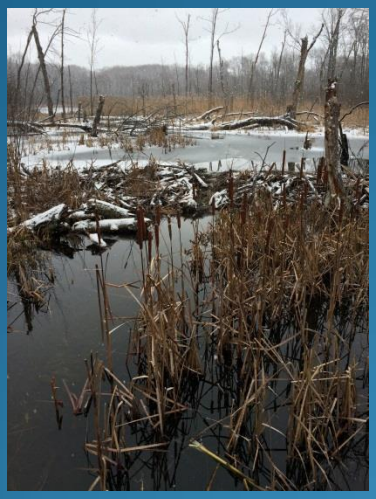

Ott Biological Preserve Management & Maintenance Plan

Calhoun County, Michigan ~ 2016

The Ott Biological Preserve is owned by the citizens of Calhoun County, operated by the Calhoun County Board of Commissioners and under the direction of the Calhoun County Parks and Recreation Commission. This document provides procedures and policies for its care and long term enjoyment of the citizens and visitors to Calhoun County.

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INTRODUCTION & SUMMARY

The Ott Biological Preserve is a unique park located along the perimeter of the urbanized area of Battle Creek. It has 298 acres of undeveloped land with a network of nature trails. It is intended for passive activities, such as hiking, bird watching, or relaxing.

The Ott Biological Preserve Management Plan provides the basis for which the Preserve is to be maintained and managed. It contains the history of the property including land acquisition and studies conducted over the last one hundred years. This information provides the foundation for which the guidelines are based upon.

Because of the Ott's rare proximity to a highly developed urban and rural setting, its management and maintenance also require considerations to preserve its distinctive features for present and future park visitors to enjoy.

MISSION & VISION STATEMENTS

The mission and vision statements as they relate to the Ott Biological Preserve are listed below:

Vision Statement

Make the Ott Biological Preserve a well-managed, frequently visited, treasured and protected urban natural area.

Mission Statement

Develop policies and partnerships ensuring preservation of historical and ecological resources, and encouraging recreation, environmental education, and scientific research in the Ott Biological Preserve.

History

The Ott Biological preserve was first visualized in 1911 by Edward H. Brigham, founder of the Kingman Natural History Museum in Battle Creek, and teacher Jay Snyder. They initially purchased 105 acres of farm backlots on what is now the northern portion of the preserve. Initially the area was used to educate students in the Battle Creek school system. In 1926 due to Mr. Brigham's work, the area was established as a nature sanctuary.

Dr. John Harvey Kellogg purchased contiguous land and donated it to Battle Creek College. They designated it be used to "provided as an accessory of the Department of Biology to be used for field instruction and research." From 1926 to 1938 the preserve was actively managed by Battle Creek College, and used for several studies as fulfillment of the requirements for Bachelor of Science and Master of Science degrees.

Field fires were a frequent problem during this time period, and at one time a field station burned within the preserve. An extensive inventory of plants was performed during this time by Dr. Melvin Gilmore, who had been hired by Dr. Kellogg to develop plans for an ethnobotanical garden, which came to no avail.

In 1938 Battle Creek College closed its doors, and under the direction of Dr. Arthur Chickering, the preserve was purchased for Albion College, with funds provided by Dr. Harvey N. Ott, an Albion alumnus and founder of American Optical Company, maker of lenses and microscopes. The preserve was officially designated the Harvey N. Ott Biological Preserve in 1946. Dr. William J. Gilbert of Albion College performed extensive inventories of the preserve from 1946 to 1954. In 1964, an entrance from Wattles Road was completed. Dr. Anthony Catana in 1967 published an article describing the pre-settlement vegetation of the preserve as oak savanna with few trees per acre, and that the suppression of fires secondary to farming resulted in the succession to oak-hickory forest; he also noted the decline of tamaracks due to the decreasing water table.

In the 1970's, Albion College transitioned its main focus away from the Ott to its newly purchased nature preserve located on 60 acres along the Kalamazoo River in Albion. An attempt was made to establish a 10-year lease for the preserve to the Calhoun County Parks and Recreation Commission (CCPRC), with the intent to maintain the property in its natural condition, but the lease was not signed due to lack of funds. Subsequently CCPRC was able to obtain a Department of Natural Resources grant through the Land and Water Conservation Fund which covered 50% of the purchase. Final purchase occurred in 1977 for $56,000, $28,000 from the DNR, and $14,000 from the Miller Foundation. Terms outlined by the DNR and Albion College obligated the CCPRC to keep the land in its natural state with the exception of paths, and Albion College was allowed to use the property for educational purposes. No deed restrictions were placed on the property by Albion College, as it diminished the purchase price of the property.

Minimal management of the preserve occurred until 1993 when Calhoun County Commissioners sold lumber from 305 trees for $36,000 from the south end of the preserve at Peck Street. Albion College staff, including Dr. Dan Skean and Dr. Ewell Stowell protested the logging, and requested clarification from the DNR whether logging was allowed under rules of the Land and Water Conservation Fund. Logging was subsequently suspended. An advisory committee was formed to draft a management plan for the preserve; this evolved into a 501(c)3 non-profit known as the Friends of the Ott Preserve whose

goal was to "promote sound management and passive recreational use that preserves the natural features and biodiversity" of the preserve.

Supervision of the Ott Preserve was transferred to the Calhoun County Road Commission in 1995. During the time period of 1995 to 1999, grants from Consumers Power and Miller Foundation were obtained, and a $200,000 grant from the DNR was utilized to develop the Arlington parking lot, boardwalks, Jameson parking lot, kiosks, signage, and an historic bridge over the creek south of Brigham Lake. In 1995 Alex Sutarek donated 42 acres of land adjacent to the Arlington parking lot.

In 2008, the Calhoun County Trailway Alliance began plans to change a segment of the North County Scenic Trail from a natural trail to a 14-foot wide, non-motorized trailway. Portions of the proposed trail location ran along the eskers through the center of the preserve (along the established North County Trail route). Community concern regarding the degradation of natural features of the glacial terrain were raised, and a compromise was reached to move the trail along the north and east boundaries of the preserve. This allowed the preserve to maintain the center of the park for its original intention, while providing an option for the development of the Trailway.

In 2010, a grant was received from the Michigan Department of Transportation in the amount of $1,075,592 for trail development and four years later a second grant of $500,000 was received from the Michigan Department of Natural Resources Trust Fund. The remaining $298,600 necessary to complete the trail was acquired through donations from corporations and private individuals. The 5 ½ mile Trailway opened in late 2014 running from the corner of East Emmett Street and Raymond Road to the Ott Biological Preserve, south to Kimball Pines, and ending at Historic Bridge Park.

Finally, an endowment to fund the management and maintenance of the Trailway was agreed to by the CCTA and Calhoun County. The amount of at least $500,000 was established as the target amount to be raised. As of 2016 approximately $10,000 has been raised.

Natural Area Description

The following sections describe the abiotic and biotic components of the Ott Biological Preserve. Supplementary information such as soil maps and species lists can be found in the appendices.

Geology

The Ott Biological Preserve lies in southern Michigan in northwestern portion of Calhoun County. The cities of Battle Creek and Marshall are two miles to the west and six miles to the east respectively. The Ott Biological Preserve (referred to hereafter as 'the Ott,' 'the Preserve') spans nearly 300 acres of unique and important natural communities in between urban and suburban populations. The Preserve surrounds two natural lakes, extensive wetlands and low-lying and upland forests.

To understand the landscape surrounding the Ott, we rely on geologists to interpret the history of the land, it soils and natural features. Hundreds of millions of years before present, ancient seas covered what would eventually come to be Michigan. Sediments were laid down on the seabed that would eventually become our bedrocks. The seas shifted and over millions of years, slow-moving glaciers descended out of the north and east that sculpted the land we live on now. These glaciers advanced and retreated three times over millennia. They alternately covered and scoured Calhoun County and the Ott with sheets of ice that were thousands of feet thick. Each successive wave of ice ploughed and scraped

the earth clearing away the remnants of the previous ice advance. The last such advance and retreat of glaciation ended tens of thousands of years ago.

There are still remnants of the last glaciation like moraines, kettle lakes and eskers in southern Michigan. These glacial features dot our landscape and are present in the Ott. Our county's fertile expanses of soil are a function of the glaciers too.

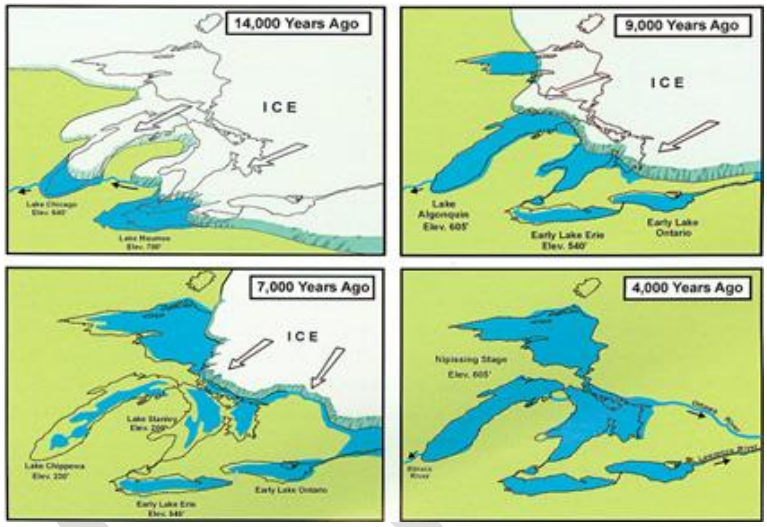


Figure 1: Glacial action shaped the Michigan we know today

Post-glaciation, tree species, mostly spruce, invaded from the south and east. Over time as the climate became more favorable, pine trees migrated in to our state. Further warming and drying of the climate allowed oak species to become established. The oaks formed prairies and savannahs that dominated the landscape for thousands of years and as the climate shifted to cooler and wetter weather, tree species like maples and birches carved out places in the landscape. Following the trees, animals and finally, man moved in to what would become Michigan.

Landscape Context

Circa 1800, Michigan was being surveyed by the General Lands Office to support settlement of the state. The surveyor's notes describe open expanses of tallgrass prairie interspersed with stands of oak trees in the lands immediately surrounding the Ott. This oak savannah was likely burned frequently by Native Americans to maintain open expanses. The land inside the Ott was described by the surveyors as a conifer swamp. Following European settlement, the landscape surrounding the Ott transitioned to agriculture and urban land uses making the Preserve a unique remnant of Michigan's natural past amidst human development.

Figure 2: The Ott in a 1946 aerial photograph

To help characterize the surroundings of the wild and primitive Preserve, the following is a description of the human environment which has been built since the settlement of Michigan. Within a half mile to the south lays the Detroit to Chicago train route and still further south lays the Kalamazoo River.

Within a mile to the west, this rail line converges with another that turns northward at the Norfolk Southern switching yard. The Ott is bounded on the northern end by the rural Verona Road that connects Marshall to the Battle Creek and the Penfield area.

The past 100 years has seen the Ott's rural setting transition toward a rural / urban interface, as development pressure from Battle Creek moved eastward along the Michigan Avenue corridor immediately to the south of the Ott. Using a series of air photos that date to 1946, we find that the immediate eastern edges of the Ott have been developed into suburban neighborhoods while the western boundary of the Preserve is now defined by the open landscape of a high voltage transmission line. The southern boundary was an apple orchard, and had, by 1961 been developed to a degree with a little more than a mile of roadwork through the orchard.

Development was never realized at the site and the plantation land and roadwork became a part of the Ott in what is now known as the Sutarek property. Remnant apple trees can still be found growing in that area.

Climate and Weather

Michigan's climate and weather patterns are largely determined by its northerly position in the continent and strongly influenced by the Great Lakes which surround the state. The lakes directly affect the amount and type of precipitation that falls in any given season and thus influence the type and kinds of vegetation in a region.

The term 'climate' describes a long term average value for physical phenomena like air temperature and rainfall. This long term average is calculated for a 30-year interval, and is recalculated every 10 years. The most recent climate averages have been calculated for the period of time from 1981 to 2010. The observations of air temperature, rainfall and the like are taken at long term and well-maintained weather stations.

Weather,' on the other hand, is the daily expression of the climate. We experience temperatures, dew points and rainfalls every day, which can vary significantly from day to day or hour to hour. Weather is driven by short term phenomena like cold and warm fronts, high and low pressure zones, clippers, and vortexes that may last days too weeks.

Here we report on climate normals for Calhoun County and the Ott Preserve in terms of air temperature (maximum, minimum, average) and rainfall.

The following data were extracted from the PRISM Climate Group of Oregon State University. The PRISM Climate Group gathers long term weather observations to produce climate estimates across the United States. The PRISM climate dataset is the official climate dataset of the United States Department of Agriculture. Data for the Ott Biological Preserve were extracted from the PRISM Data Explorer and are taken from a four square kilometer region that surrounds the Preserve centered on 43.3181 North, -85.1246 West.

Monthly Precipitation

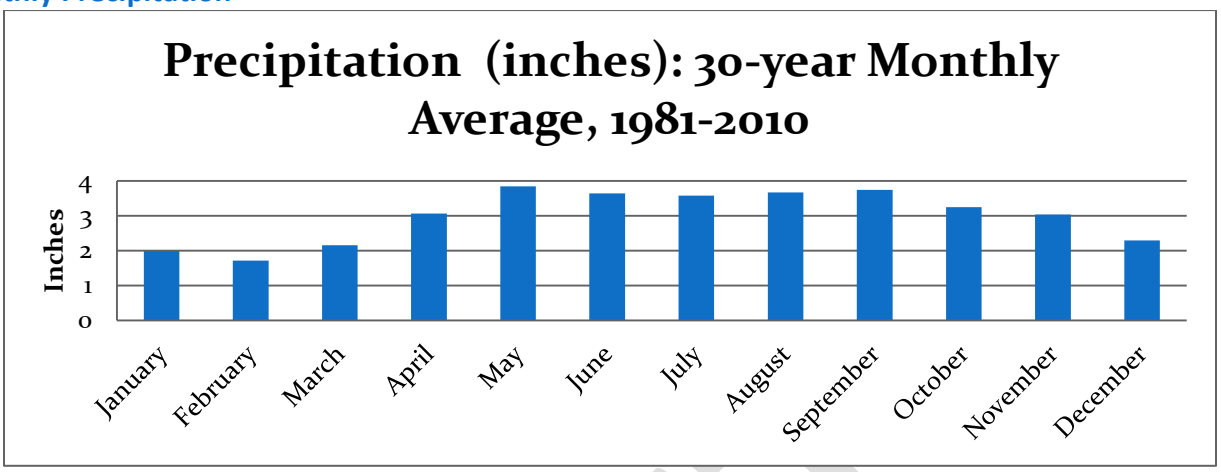


Figure 3: Normal Monthly Precipitation

This graphic depicts the average rainfall for each month over a thirty year period from 1981 to 2010. From the graph we can see that there are eight months of the year (April through November) where we could expect three inches or more of rainfall. Five of those months (May through September) average greater than three and a half inches of rainfall.

Air Temperature

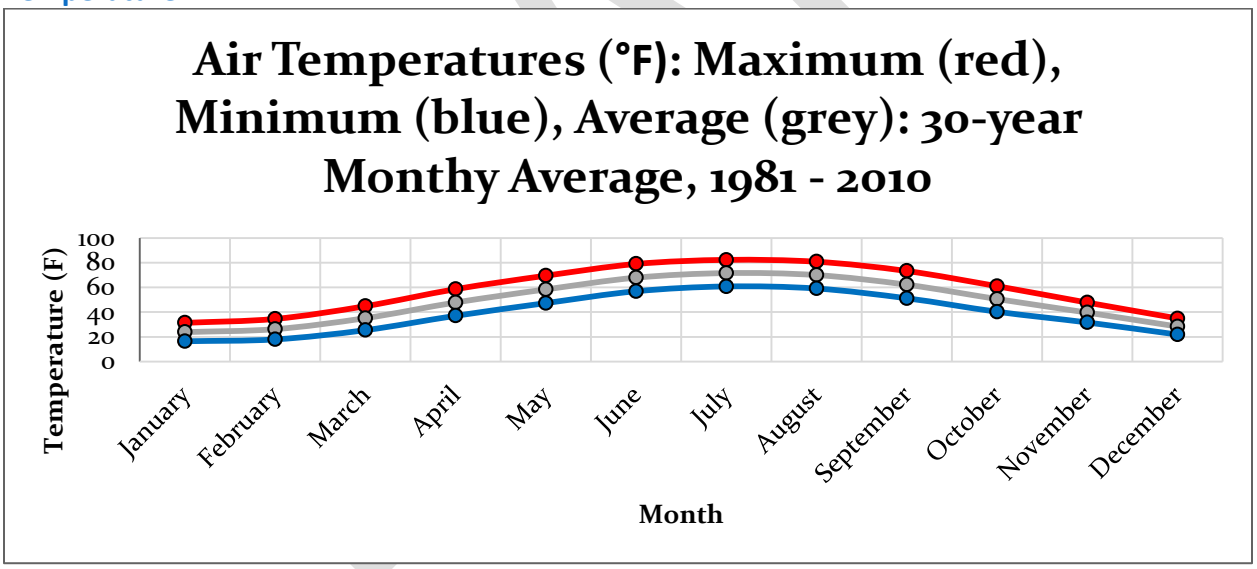


Figure 4: Normal Air Temperatures

This graphic depicts the average air temperature for each month over a thirty year period from 1981 to 2010.

Climate Change

Scientific investigations indicate that our global climate is changing at an unprecedented rate and is becoming less predictable. Studies and computer simulations have revealed that local level effects will remain challenging to predict. However, some conclusions can be had: greater uncertainty in what we consider the 'normal' and higher variability. Long term climate averages may be unaffected for a

region, but the variability in our weather systems may increase such that extreme events become more commonplace. The total amount of annual precipitation might stay the same, but the timing and amount of that rainfall may change. For example, our climate normal precipitation for the Preserve in the month of July indicates an average of a little more than three and half inches. Climate scenarios indicate that while we might still expect the same amount of precipitation for the month, but it could be delivered in one or two catastrophic rainfall events or in 30 minor events.
It is the change to extremes and the timing and delivery of precipitation that is expected to be the most challenging issues for natural ecosystems and man-made systems. Adaptation to a system with greater variability in temperature and precipitation requires time and energy.

Water and Hydrology

The diverse interplay of mineral-laden groundwater, lakes and streams drives the rich vegetation communities that make the Ott unique. The significant changes of the land use and land cover in the lands surrounding the Ott also play a role in the hydrologic system.

The Ott is home to all of Brigham and Hall lakes and a portion of Dexter Lake. Brigham Lake, approximately 4 acres, has multiple spring inlets and flows out to the southwest where a short stretch of creek (4/10ths of a mile) leads to Hall Lake, approximately 8.5 acres. Hall and Dexter lakes are connected by a short section of stream, but the exact flow direction between the two lakes and their respective outfalls are ambiguous. Both lakes appear to have outfalls on their western sides. Water surface elevations for Hall and Dexter lakes are similar with current data showing Hall Lake having a slightly higher elevation which indicates water would flow from Hall to Dexter. However, the outfall from Dexter Lake is slightly higher than that of Hall Lake. Ultimately, both lake outfalls pass in to the same channel which flows to the southwest and out of the Preserve, where it joins an 11 acre impoundment immediately uphill of the Norfolk Southern switching yard.

Figure 5: Brigham Lake looking south

Scientific research by Albion College investigated Hall Lake in 1966. In 1970, two studies were done on Brigham Lake that focused on the fate and transport of nutrients.

When the Ott was designated as a 'biological preserve' it also preserved the unique geologic and hydrologic features. The extraordinary diversity of the plant communities in some areas of the Ott are present because of the unique mineral hydrology. The remnant esker and the glacial origin of the uplands surrounding the Ott serve to store and feed groundwater in to the Preserve through the upwelling of natural springs, often at the steepened bases of glacial moraines and eskers. The spring waters carry with them dissolved minerals that feed in to Brigham and Hall lakes. Some of these minerals precipitate out of the water and form marl, a calcium carbonate that can drive diverse and unique communities of plants as in the prairie fen described below.

The National Wetlands Inventory database, created by the U.S. Fish and Wildlife Service, describes the majority of the area around Brigham Lake as freshwater forested and shrub wetland, with a small area on the eastern margin of the lake as a freshwater emergent wetland. The areas surrounding Hall Lake

are described as freshwater emergent and small areas of freshwater forested and shrub wetland. More definitive habitat descriptions follow below.
It is likely that lake levels fluctuate throughout the course of the year due to rainfall, evaporation and groundwater inputs. Dam building activities of beavers also creates long- and short-term fluctuations in the lake levels. Dams serve to retain water which in turn creates a shallower water table, and increases soil moisture in a basin. Beaver dams are porous to water, meaning that they do completely stop the flow of water downstream. In a stream setting, beaver dams are often overtopped or destroyed on average every two years. Dams built across the outlets of lakes occupy less dynamic hydrologic conditions, but we could also expect a lake dam to be a transient structure with a similar longevity. Ultimately, these fluctuating water levels can dramatically alter the landscape and vegetation communities surrounding the lakes. Bogs, tamarack swamps and prairie fens, all habitats within the Ott and described below, are vitally linked to water.

As noted in the landscape context section, the lands surrounding the Ott have becoming increasingly more urbanized, especially in the last 50 years. The most notable developments are those on the south and eastern borders of the Preserve. Information with regards to how these housing units deal with septic waste (municipal sewer versus residential septic) is not readily available. Storm water runoff can also be a major concern if it is not dealt with appropriately and in a systematic manner (i.e. municipal management system). The high density residential development on the immediate eastern boundary of the Preserve lies uphill from Brigham Lake and therefore is cause for greater scrutiny depending on the status and presence of sewer and storm water runoff systems. It has a greater potential for impacting the Preserve because in general, groundwater flow will likely be in the downhill direction toward Brigham Lake, and the area is likely a zone of groundwater recharge, so leaking or broken septic systems have the potential to contaminate the groundwater springs that feed Brigham Lake and the environments downstream.

Soils

The different soil series are described using the United States Department of Agriculture Natural Resource Conservation Service's SSURGO database. The soil information was created by soil scientists and describes the origins, uses, erodibility, productivity and other parameters for a given soil type. This data was accessed by the USDA NRCS Web Soil Survey application (see Appendix A.)

The Ott has three distinct soil types: Houghton muck, Coloma loamy sand, and Boyer sandy soil. These soil types occupy different terrains (upland versus lowland) and will determine, in part, which types of vegetation communities exist in an area.

The Houghton muck is a lowland soil often formed in depressions. It is a poorly drained soil and accordingly is associated with a high soil moisture and/or saturation from groundwater sources. It was formed primarily from decomposed herbaceous organic material. In the Preserve, Houghton Muck makes up much of the area surrounding the lakes, with a small unit in the northern lobe and a significant area west of the esker. Houghton muck makes up approximately 98 acres or 33% of the Preserve's soil.

Coloma loamy sand was formed in the outwash plains of the retreating glaciers and makes up most of the upland soils in the Preserve including the remnant esker. Coloma soil is very well drained with generally low water storage owing to the large sand fraction in the soil column. Coloma loamy sand makes up approximately 79 acres or 27% of the Preserve's soil types.

Boyer sandy loam is the last major soil type found within the Ott. It is another upland soil type similar to the Coloma soil in that it is well drained with low soil moisture. The Boyer soil type makes up 103 acres or approximately 35% of soil area. In the Preserve, the Boyer soil type is generally located in between the lowland Houghton muck and the upland Coloma soils. This boundary is not as distinct in the northern lobe of the Preserve where all three soil types are found.

Flora and Fauna

The Ott is renowned for its excellent diversity of plant and animal life which includes many of Michigan's Species of Special Concern. The importance of documenting and listing the species that make up the biological component is to provide a current accounting of the wildlife that is present and to provide a baseline of data for future managers and management actions.

The diversity, abundance and location of plant species are well documented in Gilbert's 1954 and Bowen and Skean's 2015 bodies of work. We have provided an adapted list of those plants in the appendix.

The wildlife in the Ott has not been documented to the same degree as that of the botanical specimens. Wildlife data exists largely through the efforts of Albion College and through Citizen Science volunteers. Fish and plankton data were recorded during the 1960's as a part of Albion College's management of the Preserve. Bird and herpetological (salamander, lizard, snake, turtle, toad, and frog) data are actively being recorded in online data warehouses such as the Audubon Society's eBird and the Michigan Herpetological Atlas.

Data extracted from the eBird database indicates that there have been 119 different species of birds identified at the Ott Biological Preserve since 1995. This data includes observations of Trumpeter Swans and ospreys, both Species of Special Concern.

The Michigan Herpetological Atlas indicates that 137 individual observations were reported within a 3-mile radius of the Ott Preserve, representing a total of 25 unique species. Notably, the Eastern Massasagua Rattlesnake, a Species of Special Concern, was observed on three separate occasions within the area reported.

Figure 6: Eastern Box Turtle at the Ott, June 2015.

Complete lists of bird and herpetological data can be found in Appendix C and D. Fish and plankton data are archived with Albion College.

MAJOR HABITATS

There are six major habitat types that can be found in the Ott Biological Preserve. Two of those are considered rare and endangered habitat types at the state and global levels.

For this management plan, we draw heavily on the body of scientific knowledge from the faculty and student body of Albion College. Battle Creek College also produced early and significant contribution toward knowledge and the Ott's preservation. Albion College's long history of viewing the Ott as a natural classroom has produced an enormous amount of information. The major habitat types described hereafter are the result of work done by Anna Bowen and Dr. Dan Skean. Their recent work in the Ott (2015) revisited scientific botanical surveys conducted in the 1950s. Their work identified the major habitats that are presented below.

Bowen and Skean have described the different habitats in the Ott as: aquatic, bog, dry-mesic prairie, dry-mesic southern forest, prairie fen and southern hardwood swamp. Their work described another category which they dubbed 'disturbed oak-hickory forest.' This particular area is known as the Sutarek property, the site of the former orchard. We have chosen to consider this property as the dry-mesic southern forest in the interest of habitat description. This particular section of the Preserve may see different management actions owing to its history, soil type and landscape position.

For a deeper understanding of the vegetation communities identified by Bowen and Skean, we turn to the Michigan Natural Features Inventory (MNFI). The MNFI is the work of Michigan State University that conducted state wide surveys to identify, classify, and describe the natural ecological communities across the state of Michigan. Information about each community is published in an MNFI Community Abstract.
Their ongoing work describes each natural community in terms of the following characteristics:

- Physiographic Context – identifying its place in the landscape
- Status – how it is ranked according to ecological principles
- Natural Processes – the major natural forces that shape this community
- Vegetation Descriptions – the major types of expected vegetation
- Vegetation / animal species – notable animal, insect or plant species
- Management strategies – actions that will preserve or enhance this community
- Research Needs – scientific activities that will support management actions

We follow this convention in our descriptions of the major habitat types. Not all habitat types will have all components. We also use the mapped boundaries of each habitat developed by Bowen and Skean.

Each habitat description will include a geographic description in the Preserve, a qualitative and / or quantitative assessment along with a detailed inventory of the components of that habitat as they are known to exist. Please refer to the Natural Community map for more specific location and its relation to other habitats.

Figure 7: Natural Community Map

Aquatic

Physiographic Context - The aquatic environments of the Ott Biological Preserve include Brigham, Hall, and a portion of Dexter lakes. Groundwater springs feed each one of these lakes and there are stream channels that connect the lakes together and to the larger hydrologic system of the Kalamazoo watershed. These habitats occupy the lowest lands of the Ott and are mostly surrounded by the Houghton muck soil type and dry-mesic southern forest and southern hardwood swamp habitat types.

Hydrology - The relatively still waters of the lake systems differ significantly from the flowing waters of the streams in terms of energy, nutrient cycles, and organism communities. Lakes are lower energy environments, generally more open to sunlight (and therefore heat energy), the atmosphere, and inputs like leaf litter, dust and other airborne particulate matter. Nutrients, particulate and organic matter tends to have longer residence times in these systems. Consequently, these inputs can provide ample nutrients for biological organisms. Streams on the other hand, are higher energy environments, where the faster moving water sees generally less sunlight and heat energy due to stream side vegetation and less direct nutrient or matter input owing to smaller overall area. Consequently, we can expect to see different organisms occupying these systems.

Figure 8: Brigham Lake outlet looking north

Natural Processes - Lakes undergo unique cycles of 'turnover' that are function of temperature gradients driven by the weather, climate and the seasons. Beginning in the spring, ice covers the surface of the lake forming an effective barrier from the world above. Light is able to penetrate to some degree, but it is largely shielded from the atmosphere and air temperatures.

At the point when direct solar radiation and air temperatures increase enough to melt the ice covering the lake (so-called 'ice-out') the waters of the lake will begin to warm from direct solar radiation. At this point, lake waters will begin to rapidly increase in temperature and will mix with the deeper waters distributing the heat energy. The mixing is increased by winds and spring rains. At some point early in the spring, the lake temperature will be the same at all depths, so-called turnover or isothermal. This has a profound effect on the structure of the lake in terms of chemical nutrients and organisms. When the lake is isothermal, nutrients, minerals and oxygen are free to travel up and down the water column and are not restricted by temperature gradients.

As spring turns to summer, the sun climbs higher in the sky and the days become longer. Lake waters absorb the sunlight and heat energy and become warmer. Warm water is more buoyant than cold water, so that warm water floats on top of the colder water. In lakes where the warm water layer does not reach all the way to the bed of the lake, there becomes a distinct transition zone between warm and cold. This zone is called the thermocline, which can, in some lakes become a serious barrier to nutrient and oxygen movement in a water column.

The onset of fall brings colder air temperatures and rains. At this point, the lake is warmer than the surrounding air temperature and the accumulated heat of the summer begins to flow back in to the

atmosphere. This net transfer of heat energy is increased by winds and rains. When enough heat has been dumped back into the atmosphere, the lake waters are again isothermal, and the nutrients and oxygen are able to mix about the water column unrestricted. When winter winds and snow arrive, the lake surface is cooled to freezing and ice forms on the surface of the lake, effectively shielding the lake from direct sun and the atmosphere until the spring.

Management strategies - The largest source of water for the lakes and streams of the Ott are the groundwater springs. Therefore, any management actions need to consider its effects on the groundwater springs and the maintenance of their water quality. Also, ascertaining the sewage and storm water systems of the residential developments on the eastern and southern borders of the Ott should be a primary concern for management.

Research Needs - Baseline water quality sampling for each of the lakes and as many springs as is feasible should be considered. Baseline data will help future management teams understand any change in water quality that may have occurred due to natural or anthropogenic sources. Using the USGS, MDEQ, MDNR 'Water-Quality Characteristics of Michigan's Inland Lakes 2001-2010' study as a guideline for sampling parameters, we recommend emulating the sampling strategy described therein. These parameters include: alkalinity, calcium, chloride, hardness, magnesium, sodium, sulfate, potassium, nitrogen-species, phosphorus, chlorophyll-a, and lake color. Additionally, sampling for E-coli with genetic markers to determine animal or human sources would be useful to understand if leaking septic systems have impacted the surface- or groundwater resources. The studies by Grant in 1927 and those outlined by Catana in 1966 and 1970 would also serve to understand any change in the aquatic ecosystems that have occurred over the course of the interceding decades. Finally, a study to understand the link between climate, weather and the effect of ice-on and ice-off dates would serve to link the Ott to larger multi-disciplinary climate change studies that are occuring worldwide.

Bog

Physiographic Context - Bogs occupy lowland depressions on poorly drained, highly acidic soils or occur as floating mats of vegetation at the margins of lakes and ponds. Bogs are nutrient-poor peatlands that are dominated by sphagnum mosses and small shrubs. In the Ott, bogs can be found around the southern and eastern margins of Brigham Lake and the northern and eastern margins of Hall Lake.

Status - Bog communities are ranked as S4: uncommon but not rare at the state level.

Hydrology - Bogs are water communities and they are sensitive to alterations in water levels and water availability. The mosses of the bog community have tremendous water-holding capabilities and are usually saturated.

Natural Processes - Bogs form in saturated or inundated conditions on undecomposed organic litter which allows the formation of peat. Sphagnum mosses increase the acidity creating a local environment that is not conducive to other vegetation. Bogs can be positively or negatively affected by the dam-building activities of beavers. Upstream of a beaver dam, lands can become inundated creating conditions favorable to bogs while downstream under presumably drier conditions a bog could experience unfavorable development conditions. Fire is also a natural disturbance to which bog communities have adapted. Fire can reduce or eliminate forest encroachment and many of the heather family shrubs that thrive in bogs are fire-adapted.

Vegetation Descriptions - Bogs are characterized by a carpet of sphagnum mosses, low lying shrubs of the heather family, and bryophytes. Trees can be established in bogs, but because of the poor anchoring available, are often uprooted by strong winds.

Management strategies - Bogs support a unique assemblage of plant communities and store large amounts of carbon in their peat. Records of past environmental changes (fire- or climate-related) are stored in their peat profiles, and so serve as a unique storage facility. Protecting bog communities relies on protecting water supplies and minimizing direct disturbance to bog mats. Returning fire or allowing fire to burn across bogs can be useful in maintaining a healthy bog community.

Research Needs - Bogs respond to both changes in water availability and connection with groundwater. Monitoring the change in bog communities over time as a function of beaver flooding would illuminate the connections to bog size and quality as a function of beaver activity. As bogs also store the record of past environmental changes in their peat, therefore coring peat profiles for evidence and dating of historic and prehistoric fire would give greater insight of fire frequency and severity for the region.

Dry-mesic prairie

Physiographic Context - Dry-mesic prairies are native grassland community types that occur on open, sandy or loamy soil types near glacial outwash plains or moraines. Generally, the prairies are dominated by grass with very few trees. In the Ott, the dry-mesic prairie is restricted solely to the ITC high voltage transmission corridor that forms the western boundary of the Preserve. It is very likely that this community type would not exist in the absence of the corridor and vegetation management actions that the corridor receives.

Status - Dry-mesic prairies are classified as S1; critically imperiled in the state because of extreme rarity.

Natural Processes - Historically, fire has played a critical role in the generation, maintenance and expansion of the dry-mesic prairie. The role of fire was likely introduced by Native American tribes and done to keep the landscape passable, reduce briars and brush, and increase visibility for hunting and defense. In the absence of fire following the settlement of the state by Europeans, dry-mesic prairies have been reduced in number and area, having been succeeded by other vegetation communities.

Vegetation Descriptions - The primary vegetation for these prairies are tallgrass species like big and little bluestem, and sedges. Shrubs and trees were reduced or eliminated due to periodic burnings every 2 to 3 years. Dry-mesic prairies are thought to have formed a continuum of habitats with oak openings, oak savannahs and other prairie types circa 1800.

Vegetation / animal species - Notable species of insect and plants are associated with dry-mesic prairies. Formica ants are important biological components of prairie soils serving to aerate and mix the soil. Bowen and Skean note a plant species of state special concern, the lead-plant, which they documented in the prairie.

Management strategies - Historically, dry-mesic prairies existed due to the presence of fire which reduced or eliminated tree and shrub species. In the Ott, the prairie exists because the high voltage transmission corridor requires regular vegetation management to reduce tree and shrub cover. This management acts as a proxy of fire, but without some of the ecological benefits: some species are

naturally fire-adapted (i.e. big and little bluestem prairie grasses), but there are no species that are mower or herbicide adapted, thus vegetation is managed simply to maintain a lack of trees that would threaten the transmission line.

Research Needs - Studies regarding the methodologies of prairie management in the absence of fire will benefit regional efforts to manage similar communities with similar restrictions.

Dry-mesic southern forest

Physiographic Context - Dry-mesic forests are oak-dominated forests that occupy soils that are well- to excessively-drained. These forest types evolved as a result of episodic fires in pre-settlement Michigan. This forest type is the dominant forest type in the Preserve totaling more than 170 acres. It is the first forest type that greets visitors at both the Arlington and Jamison parking lots and it surrounds the lower lying wetlands and lakes.

Status - This forest type is classified as S3: vulnerable in the state due to a restricted range, relatively few occurrences, recent and widespread decline.

Natural Processes - Dry-mesic southern forests are dependent on regular disturbance to maintain their community structure and viability. Disturbances in this oak-dominated forest serve to open up the canopy and increase light availability and reduce competition for water and nutrients. Seedlings respond by generally rapid recruitment to the canopy. Historically, this agent of disturbance was Native American initiated fire, but any process that opens up the forest canopy and reduces competition at the forest floor can aid this community's existence. Wind, ice and snow storms can serve in this fashion. On the forest floor, fire reduced litter that impedes acorn germination, thins out understory vegetation and inhibits acorn predation and pests. In the absence of disturbance, shade tolerant tree species can raise to dominance which inhibits the growth and recruitment of oak species. This transition from oak-dominated landscapes to maple-dominated forests is well documented and happening to some degree in the Ott due to elimination of fire and lack of a significant disturbance regime.

Vegetation Descriptions - Dry-mesic southern forests are composed mainly of oak and related species. White, red, and black oaks compose the canopy dominants with red and sugar maples, pignut, bitternut and shagbark hickories, black cherry, beech, tulip, black walnut and sassafras. White pines, big tooth and trembling aspens are also associated with this forest type.

Management strategies - The maintenance of dry-mesic southern forest relies on disturbance. In the absence of disturbance (in most cases, fire) these forest types have transitioned to other community types. The reintroduction of prescribed fire as a management tool presents a holistic way to rejuvenate this forest type and bring about the most beneficial ecological results (i.e. increased light to the forest floor, reduced competition for water and nutrients). Creating gaps in the forest canopy (i.e. fire proxy) can work favorably and research has indicated that openings greater than 4,300 ft^2 support oak regeneration. This is an equivalent 65 foot by 65 foot opening created in the forest canopy. Increased density of deer can be a threat to the forest structure due to selective browsing of oak seedlings.

Research Needs - There are few long term studies regarding the use of fire as a management tool for dry-mesic southern forests. Fire return interval, rotation, frequency, intensity and severity are issues that must be addressed for proper management. Artificially created canopy gaps (i.e. human created) need to be evaluated as a potential tool and compared to fire-created canopy gaps for comparative studies.

Prairie fen

Physiographic Context - Prairie fens are biologically and geologically unique wetlands found only in the glaciated regions of the Midwest. They are characterized by, and rely on, mineral laden groundwater sources typically found at the boundary of outwash plains and moraines where course glacial deposits force groundwater to the surface. In the Ott, the prairie fen community lies to the south and east of Hall Lake and makes up the northern edge of Dexter Lake. Bowen and Skean have mapped the edges of the fen and their efforts indicate that the fen is not limited by the boundary of the Preserve and likely extends around the margins of Dexter Lake to some degree.

Status - Prairie fens are ranked S3: vulnerable in the state due to a restricted range, relatively few occurrences, recent and widespread decline or other factors making it vulnerable to extirpation.

Figure 9: Prairie fen looking northwest

Natural Processes - Hydrologic processes are vitally important to the maintenance and long-term vitality of the prairie fen community. The mineral laden groundwater flow to the surface creates the soil and vegetation types that make this community unique. Fire was also a common component of prairie fen habitat.

Vegetation Descriptions - Prairie fens are generally composed of 3 or 4 vegetation zones: inundated areas around streams or lake margins, saturated zones where water is present but not necessarily expressed to the surface, a wooded zone around the upland margins of the fen and occasionally a vegetation zone associated directly with the source of groundwater seepage.

Vegetation / animal species - The federally-listed endangered butterfly specie, Mitchell's satyr, is closely associated with the wooded margins of prairie fens. Though this specie has not been sighted in the Ott, to our knowledge, there has never been an explicit attempt to detect its presence. This butterfly has been observed in counties surrounding Calhoun, and if suitable habitat exists at the Ott, then it may be a site for possible observation and/or reintroduction. The white ladies-slipper is a flower that is also closely associated with the prairie fen community. It is a State Threatened species.

Management strategies - Protecting the hydrologic function and integrity of the immediate area and surround the fen community is a top priority for management. Groundwater flow can be altered, disrupted or contaminated by agriculture, agricultural activities (i.e. ditching, draining, fertilizer and pesticide application) and residential or commercial development. Groundwater recharge zones can be contaminated by leaking septic or sewer systems, nutrient laden agriculture or residential lawn care, or storm water runoff. Control of invasive species to prevent the loss of native fen species is also a top management priority.

Research Needs - Patterns of hydrologic disruption and fire frequency are not well understood issues that present management challenges to the integrity of prairie fens.

Southern hardwood swamp

Physiographic Context - The southern hardwood swamp is a forested wetland. Habitats of this type occur on glacial landforms with poorly drained, seasonally flooded, or permanently saturated soils. There are three major southern hardwood swamp areas in the Ott. The smallest area lies along the northernmost section of the Preserve and totals less than 10 acres. Near the northwestern portion of the Preserve, close to the Jameson entrance is a low lying area of southern hardwood swamp that is approximately 36 acres. The largest section of southern hardwood swamp is 45 acres and lies east of Brigham Lake and stretches south to the northern most portion of Hall Lake.

Status - Southern hardwood swamps are ranked S3; vulnerable in the state due to a restricted range, relatively few occurrences, recent or widespread decline, or other factors making it vulnerable to extirpation.

Natural Processes - The primary natural processes that affect the community structure, composition and health are groundwater and surface water dynamics and small-scale wind throw. The seasonal inundation or perennial flooding of the forest floor creates conditions supportive of peat and mucky soil development that few species tolerate. The weak structure of the soil (in the case of the Ott, Houghton muck) does not allow deep root development and therefore trees are susceptible to toppling or uprooting in strong winds (wind throw). The roots of the overturned trees are exposed to the air and create a shallow depression. This 'mound and pit' topography is characteristic of the southern hardwood swamp and can create microclimates for plants and animals to thrive. The gaps in the tree canopy left by thrown trees allow sunlight to reach the forest floor which supports light dependent tree, shrub and herb species. Beaver activity can positively or negatively affect the southern hardwood swamp through desiccation or total inundation.

Figure 10: Windthrow near the boardwalk in the southern hardwood swamp

Vegetation Descriptions - Southern hardwood swamps are characterized by a variety of lowland hardwoods and the absence of confer species.

Vegetation / animal species - Characteristic species of trees include: silver maple, red maple, black ash, green ash, and yellow birch. Secondary species associated with the southern hardwood swamp are sugar maple, shagbark hickory, hackberry, beech, white ash, tamarack and the tulip tree. The southern hardwood swamps create habitats critical for a variety of animals. The striped chorus frog, the northern spring peeper, green frog and the eastern gray tree frog are frog species that are common. Sites that are close to perennial bodies of water (like the Ott) may provide crucial habitat for salamander species that need open water for breeding, rearing, or other life stages. Reptiles like the spotted turtle, Blanding's

turtle and Kirtland's snake are commonly associated with the southern hardwood swamp. The emerald ash borer is an invasive insect that has devastated the ash tree populations in Michigan. Therefore habitats rich in ash, such as the hardwood swamp have seen a near-complete loss of this dominant tree species.

Management strategies - Management actions should focus on preserving groundwater and surface water hydrology, protecting groundwater seepage zones in nearby uplands to maintain the integrity of the southern hardwood swamp. Hydrologic disturbances can cause the desiccation and subsidence of peat and muck soils that support the hardwood swamp.

Research Needs - Understanding the connectivity of the groundwater to the local and regional recharge zones is important not only for the hardwood swamps but for most of the groundwater dependent natural communities. Understanding the short and long term effects of the emerald ash borer will have on the hardwood swamp community structure and composition will become increasingly important as time progresses. The opening of the canopy will support the recruitment of light dependent seedlings however the degree of light affecting the forest floor will depend on the overall number of ash killed in any given stand.

MANAGEMENT CHALLENGES

Invasive Species

Plant species considered 'invasive' in the Ott Biological Preserve have doubled in the last 60 years. Dr. William Gilbert from Albion College conducted an inventory over a nine year period between 1946 and 1954 that identified 466 different species, of which eight are now considered invasive (Gilbert, 1954). Recent work by Bowen and Skean (2015) identified 597 species, 131 newly-recorded and 19 considered invasive.

Control of all invasive species is not possible due to the size of the preserve and the intensive labor involved; however control of certain types of these invaders will enhance the native environment, preserve natural communities, encourage the growth of native plant species, and enhance the aesthetics of the Ott Biological Preserve.

Active management of invasive plant species is important because they aggressively compete with native plants for water, sunlight and soil nutrients. Invasive plant species will often shade out, secrete inhibitory chemicals, alter local hydrology or disrupt patterns of natural disturbance to the detriment of native populations. Invasive plant species often have an advantage over native plant populations in that they produce abundant seeds, resprout from cut stems and small root fragments or leaf-out earlier in the season to out compete native populations. The end result of invasive species dominance is a loss of native plant and animal diversity and a disruption in the ecological balance of Michigan's natural communities.

Because of the ecological (and existential) threat posed by invasive plant species, our primary recommendation is to develop a separate invasive species management plan specific to the environs and sensitivities of the Ott. This plan should consider the five over-arching questions listed below, but also take in to consideration species-specific treatment methods that minimize damage to native species and

maximize effects on targeted species. For this information, we can point to the Michigan Department of Natural Resources "Invasive Species – Best Control Practices" documents for specific information.

As a secondary recommendation, we advise the use of herbicides by qualified personnel for the treatment of invasive species within the Preserve.

The following are questions that management should answer to develop a treatment and control strategy for the Ott Biological Preserve.

1. **What is the value of the particular habitat or site?** Is it unique or particularly vulnerable to invasive species degradation? Is it vulnerable or special regardless of invasion?
2. **What is the area of infestation? How dense is that infestation?**
3. **What are the impacts of the invasive species?** Will they alter local hydrology or secrete inhibitory chemicals or increase/decrease fire susceptibility?
4. **What is the feasibility of controlling, mitigating or eradicating the invasive species?** Is the population in a hard-to-reach area? Does treatment require herbicide application or permitting?
5. **Is there a long-term commitment by the managing agency or its community of partners to treating and monitoring invasive species?** Are volunteer groups coordinated or capable to accomplish management goals? Is there funding to accomplish treatment and monitoring?
6. **What species are going to be targeted?**

At present, we have used Bowen and Skean's list of invasive species with their relative locations and abundances to develop the following list of priority areas. This allows us to answer, to some degree, the first two questions in a treatment strategy. Answering the remaining questions will fulfill the remaining requirements to develop a sustainable invasive species management plan.
List of priority sites based on sensitivity, uniqueness or special conservation value

- Prairie fen based on unique and vulnerable habitat and native species
- Dry-mesic prairie based on unique habitat
- Calhoun County Trailway margins based on recent earth-moving activities, increased usage sunlight and water availability.
- Open waters of Hall, Brigham and Dexter lakes and stream habitats that connect them based on habitat importance and sensitivity.

The following are a list of common invasive species that can be found in the Ott Biological Preserve. This list does not represent a comprehensive accounting of all the invasive species nor their treatment methods or timing. Again, we defer to the Michigan Department of Natural Resources "Invasive Species - Best Control Practices" for a more definitive approach toward treatment options.

Garlic Mustard (*Ailiaria petiolata*)

Garlic mustard is a biennial flowering plant in the mustard family native to Europe, Western Central Asia, and northwestern Africa, and is rapidly invading North America. The plant competes with native understory vegetation and suppresses the growth of native tree seedlings. It also limits tree regeneration by suppressing mycorrhizal fungi that most plants and trees required for optimal growth. White-tailed deer rarely feed on garlic mustard, which may increase browsing on other native plants. Seeds in the soil can germinate up to 10 years, requiring long term management to deplete the seed bank and allow recovery of the mycorrhizae. The seeds of garlic mustard are small and numerous, making them easy to disperse with shoes, animal fur and dirt for fill. Garlic mustard can now be found along all the trails within the Oft preserve, and in some upland wood settings.

Figure 11: Garlic mustard is a common herbaceous invasive species in Southern Michigan. (Photo: http://travelingnaturalist.wordpress.com)

CONTROL:

Hand pulling- Hand pulling for second year plants is best done in the spring prior to seed pods forming. Pulling is best done if the root is also removed, as the plant will regenerate from a broken root. Pulled plants need to be bagged and discarded since seeds can continue to develop on pulled plants. Hand pulling is effective in small infestations, but is not effective in massive infestation.

Herbicide application- Herbicides are commonly used to control garlic mustard, such as glyphosphate (Round-up) and 2-4 D. Spraying in the early spring may protect native plants that germinate later. Herbicide spraying is regulated by state law.

Weed torch- Propane weed torches can be used to eliminate unwanted plants. This again is best done in the spring when wet conditions minimize fire risk and non-target vegetation is dormant.

Common Reed (*Phragmites australis*)

Common reed is a tall perennial grass that invades wetlands. There is a native subspecies in North America, but the European invasive version is much more vigorous. Common reed releases Gallic acid which degrades to mesoxalic acid, which is toxic to native plants. Spread is mainly through its rhizome. Invasive Phragmites can be found on the borders of Brigham Lake and in the riparian corridor between Brigham and Hall lakes.

Figure 12: Invasive phragmites between Brigham and Hall lakes.

CONTROL:

Cutting- Cutting of phragmites will kill the above ground plant, but not the rhizome which will resprout, and for this reason several cuttings a year are necessary for control by this method. Shading of the cut plants can prevent regrowth, usually done with black plastic.

Herbicide application- Herbicide application of glyphosphate can be performed by spraying, application to cut stems, or wicking utilizing an herbicide soaked glove. No biological controls are yet available.

Purple Loosetrife (*Lythrum salicara*)

Purple loosetrife is a perennial plant native to Europe, Asia and southeastern Australia. It grows 1-2 m in marshy areas. Infestation crowds out native plants, especially cattails. A single plant can produce 2.7 million tiny seeds annually. It can also spread by rhizome. Once established, loosetrife stands are expensive and difficult to remove.

Figure 13: Purple loosestrife along a lake shore. (Photo: http://stephens-views.blogspot.com)

CONTROL:

Biological control- Numerous biological agents are used for Purple loosestrife control. Two leaf beetles, *Galerucella calmariensis* and *Gaierucella pusilla* are used, and are notably effective, defoliating up to 100% of the plants in an area. Also used are three species of weevil, *Hylobius transversovittatus, Nanophyes breves,* and *Nanophyes marmoratus*.

Other Herbaceous Species

Non - native herbaceous species include Stinging Nettle (*Unica diocia*), Canada Thistle (*Cirsium arvense),* Burdock (*Artium minus*), various clover species, and Spotted Knapweed (*Centaurea stoebe).* Removal of these may be for enhancement of tree regeneration, wildlife habitat, and aesthetics of the preserve. Techniques include hand-pulling, herbicide application, and weed- torch. Hand pulling tends to not be effective in massive invasion.

Invasive Woody Shrub Species

The invasive woody species are numerous, including Glossy Buckthorn (*Rhamnus frangula*), Tree-of-Heaven (*Ailanthus altissima*),
Autumn Olive (*Elaeagnus umbellate*), Common Buckthorn (Rhamnus cathartica), Black Locust (*Robinia pseudo-acacia*), Multifloral Rose (*Rosa multiflora*), and multiple Honeysuckle hybrids (*Lonicara* sp.). Of particular concern is the glossy buckthorn that has significant numbers in the prairie fen.

Figure 14: Glossy buckthorn leaf and berry detail.

CONTROL:

Pulling- Pulling is best done after cutting or herbicide application on small plants, but is not effective as a management tool by itself.

Cutting- This is not a one-time technique, as all of the above species can resprout from roots. Cutting alone can be counter-productive as it creates many small resprouts to treat.

Herbicide Application- Multiple methods of herbicide application are recommended, including foliar, basal bark, frill and cut-stump application. Foliar spray is only recommended for small plants and resprouts to minimize non-target vegetation. Basal bark application involves herbicide applied around the circumference of the stump 15-30 cm, which then soaks through the bark. Frill technique involves a girdle cut with hatchet or saw with application of herbicide to the cut. Cut-stump technique involves cutting the shrub down and applying herbicide to the stump. This is labor intensive since the cut plants need to be piled or removed. Common herbicides used include glyphosphate and triclopyr.

Biological Agents- No biological agents are available yet for any of the above woody species.

Oriental Bittersweet (*Cleastrus orbiculatis*)

Oriental bittersweet is a woody vine native to eastern Asia. It was introduced to North America in 1879. It closely resembles the native North American species with which it can readily hybridize. The vines of the plant are characteristic in that they will twist around a tree trunk, and can strangle its host to death. All parts of the plant are poisonous. It has the ability to grow to great heights, allowing it to crowd out surrounding vegetation.

CONTROL:

Cutting and Spraying -A combination of cutting vegetation and spraying is commonly used. Herbicidal agents include Troclopyr and glyphosphate. Spraying is usually done in the late fall to prevent other plants from being targeted. It is recommended that this be repeated yearly and when regrowth is observed. Triclopyr is non-toxic to most animals and insects, and slightly toxic to fish, but has a half-life

Figure 15: Oriental bittersweet in the spring and in the winter at the Ott.

of less than half a day, making it safe and effective for field use.

Beaver

Beavers and beaver dams have become a common entity in the Ott Biological Preserve. As a result of their dam activity, the lake level of especially Brigham Lake has risen, and several small ponds have occurred in the creek between Brigham and Hall Lake. Their feeding activity has resulted in several areas of clearing of underbrush. In the event that beaver's activity undermines park infrastructure, i.e. the bridge at the outlet of Brigham Lake, trapping by licensed fur-bearing trappers may be recommended during appropriate trapping seasons with consultation of the Michigan Department of Natural Resources.

Figure 16: Beaver lodge in Brigham Lake

Mute Swans

Mute swan populations in Michigan have come under scrutiny of the Michigan Department of Natural Resources. This non-native swan is noted for aggressive behavior towards humans and their competition with the native swans, the Tundra Swan, and the Trumpeter Swan. The MDNR has been actively controlling Mute Swan populations with direct elimination and destruction of viable nest eggs in other areas. In the event that Mute Swans become a problem in the Ott Biological Preserve, the MDNR has offered its services for swan control.

Figure 17: Mute swans in the prairie fen.

White-Tail Deer

White tail deer may present problems with browsing and native plant destruction. At present, because of climax forest conditions, browsing does not seem to be a significant problem.

Power Line Management

In 1950, Calhoun County and Consumers Energy entered into an agreement that conveyed "the easement and right to erect, lay and maintain lines consisting of poles, wires, cables, conduits and other fixtures and appurtenances for the purpose of transmitting and distributing electricity and/or conducting a communication business"…on land running north/south adjacent to the Ott Biological Preserve. There are above ground power lines located to the west of the park and travel the perimeter from the north to the south of the park, which are owned by ITC Transmissions. The power lines are sited on the Consumers Energy easement.

A major goal of overhead power line design is to maintain adequate clearance between energized conductors and the ground so as to prevent dangerous contact with the line, and to provide reliable support for the conductors, resilient to storms, ice load, earthquakes and other potential causes of damage.

Overhead power lines located in wilderness areas may be significantly affected by weather. Therefore ITC Transmissions conducts annual aerial inspections and ground inspections every three to five years. ITC has adopted an approach that calls for removal of incompatible vegetation in order to maintain the safety of the public and reliability of the transmission system. They identify and remove incompatible trees that can grow to the point of interfering with transmission lines; whereas trimming trees often stimulate faster growth. Proactive removal of these species and the encouragement of compatible vegetation is a long-term approach that fosters stable and sustainable transmission corridors. Their routine monitoring allows for scheduling appropriate work as needed to maintain electric service reliability and public safety.

ITC Transmissions has a Local Government and Community Affairs department with six representatives that work throughout the state of Michigan to communicate activities in the regions they service. The Community Development office and this ITC office communicate regularly to assure that each party is aware of the others activity..

HABITAT IMPROVEMENTS

The habitat communities in the Ott Biological Preserve face ecological challenges that require active management. The Ott's natural communities have suffered from a passive natural resource management action and a focus on the development of recreational opportunities at the expense of ecological integrity.

To improve the ecological integrity, the over-arching habitat improvement goals at the Ott, are actions that:

1) reduce, mitigate and eradicate invasive species (described in preceding sections), and
2) evaluate a prescribed fire strategy to reintroduce fire to certain fire-adapted habitat types, and
3) develop an oak / hickory restoration strategy in the dry-mesic southern forest canopy to encourage oak recruitment.

Prescribed Fire as a Management Tool

In southern Michigan, between 6,000 and 4,000 years before present, fire was a common ecological disturbance that worked across the landscape. During this period, oak species assumed dominance owing to a drier climate and a higher incidence of fire occurrence. Fire returned again and again to the landscape of southern Michigan over the thousands of years, and the forest communities evolved in concert. In the areas frequented by fire, what evolved was a mosaic of oak openings, barrens and savannahs. Much of this landscape is attributed to Native American civilization and their use of fire to maintain defensible space and hunting and gathering grounds, though naturally-caused fire due to lightning cannot be ruled out.

Post-European settlement instigated a landscape-level change in habitat structure as the land was cleared for agriculture and urbanization. During this period and continuing today, the exclusion of fire has driven a decline in the dominance of oak and oak communities. Fire suppression in all communities has been nearly absolute since the 1940s. Prescribed fire for prairie communities has increased in the past 20 years and gained public acceptance and relevance in natural resource management goals.

Fire has many effects on a forest. It shapes that community's presence, integrity and dominance on a landscape. In prairies, fire maintains open conditions and limits woody stemmed shrubs and trees. Fire can reduce forest floor litter that prohibits acorn germination; it can thin out groundcover that competes with oak seedling survival; it can inhibit the activity of acorn predators, pests and pathogens. Fire can stimulate sprouting and germination in certain plant species. In more severe instances, fire can remove underbrush, understory and overstory canopy members. When this happens, fire creates gaps in the overstory canopy that allows more sunlight and more water to reach the forest floor where it was not able to earlier. With this loss of competition to fire, more soil water and nutrients are available for seedlings and the next generation of canopy members are at an advantage to be 'recruited' in to the under- and overstory.

Gaps in the forest canopy are vitally important to maintain oak dominated communities. In the absence of canopy gaps maples and other species like sassafras that are shade-tolerant, rise to the overstory. In a closed canopy system (low light) oak trees are out-competed by their shade tolerant counterparts. Without canopy disturbance, maples rise to be the dominant species and oak seedlings are lost through attrition. The loss of an oak-dominated community is the loss of ecologically valuable acorn mast that supports a much richer wildlife community than do maple-dominated forests. Acorns play an important role in many different animal species diets from the shrew to deer and bear.

In the Ott Biological Preserve, there are three communities that have evolved with fire as an active disturbance in the landscape. Together, these habitats cover more than 60% of the Preserve by area. These fire-evolved landscapes are the:

- Dry-mesic prairie (>3 acres)
- Prairie fen (>5 acres)
- Dry-mesic southern forest (179 acres)

The re-introduction of fire back in to the landscapes of the Ott are not without challenges. Large populations of people live within close proximity to the Preserve; there is significant electrical, transportation and recreational infrastructure in and surrounding the Preserve; there is likely a lack of understanding regarding the beneficial ecological effects of fire and conversely a significant perceived threat.

With that in mind, it is important to point out that without the natural disturbance and change brought by fire, the Ott stands to lose a significant oak habitat community to a rising succession of maple dominance. With the loss of oak dominated forest, wildlife diversity and integrity can also be expected to change.

Fortunately, fire can be safely re-introduced in to the Ott Biological Preserve. Regionally, there are highly trained federal, state and volunteer groups that regularly conduct prescribed fires to accomplish management goals such as maintaining open prairies, combatting invasive species or promoting ecological integrity. These groups coordinate through the Michigan Prescribed Fire Council which acts as an information clearinghouse for best management practices (BMPs) in prescribing fire.

Figure 18: Prescribed fire used in a prairie burn. Photo courtesy of Restoring Nature with Fire.

The Michigan Prescribed Fire Council promotes a list of 19 best management practices (BMPs) to safely conduct a prescribed fire. Briefly, and in order of importance, prescribed burns will only be conducted once a site specific Burn Plan has been authored and accepted by the responsible agency. Burn Plans clearly identify or state:

- the management objectives and expected ecological results of the burn
- the necessary permits
- the conditions necessary to safely execute the burn
- the fire containment strategies to be followed during the burn

- crew and equipment requirements
- contingency plans if the burn progresses unexpectedly

Fire would not be reintroduced to the entire Preserve, nor would it be prescribed without a thorough assessment of all the factors necessary to conduct a burn. Fires need fuel to burn, and an understanding of the fuel loads at the Ott must be assessed prior to any prescription being written.

Oak / Hickory Restoration

To maintain a higher quality oak / hickory habitat of the dry-mesic southern forests, gaps in the forest canopy must be created to allow light and rain to reach the forest floor. Historically this was accomplished via fire, wind and ice storms. Fire was the dominant force which has been excluded, leaving wind and ice storms as the primary mechanism through which canopy gaps form. We propose a regime of manually-created canopy gaps to assist in the recruitment of oak / hickory seedlings.

Research indicates that canopy gaps that are greater than 400m^2 (>4300 ft^2) have been shown to promote oak seedling recruitment in to the overstory. Canopy gaps of this size are approximately 65 feet to a side. Further, if 10 gaps of this size were created, in total (4,000 m^2) they represent one third of one percent (0.0033) of the total area (1,191,540 m^2) of the Ott Preserve.

Gap location should be located in the dry-mesic southern forest to promote oak / hickory regeneration. Our recommendation is for canopy gap locations to be located in the Sutarek addition initially. Bowen and Skean describe this addition as 'disturbed' owing to its history as an apple orchard and then the site of road construction for a housing development that was never completed. This site has 5 'compartments' that are bounded by the road built for development. These road beds are still present and traversable today and can serve as informal boundaries.

The Sutarek addition is noted for the significant number of invasive black locust trees, many of which have reached the overstory. Removing these invasive trees may serve the dual management goals of removing invasive species and creating canopy gaps to support oak / hickory regeneration.

RESEARCH

Vision

The Ott Biological Preserve has a long history that has included significant formal scientific research. The vision is that that area of scientific research be expanded and encouraged. The preserve provides an excellent laboratory to conduct research in ecology and environmental science. Areas of research would include, but not be limited to, invasive species, ecological restoration, wetland habitat management, and nuisance wildlife control. The opportunities for scientific inquiry are endless.

The preserve is an excellent field site for research that will educate the public about natural history, ecology, the environment we live in, and the process of scientific discovery. The results of all research at the preserve need to be shared in some way with students, volunteers, and the public. Research that includes these groups, ideally through direct involvement, is strongly encouraged.

Guidelines

Ecological research is an integral part of the mission of the Ott Biological Preserve, but needs to be conducted in a manner that does not diminish the natural resources of the preserve. Therefore, the following guidelines and restrictions are placed on the types and methods allowed on the preserve. These include:

1. Research that removes, damages, or otherwise dramatically alters the existing native vegetation, reduces habitat for wildlife, increases the potential for the spread of invasive species, or otherwise negatively impacts the preserve will not be allowed. Exceptions to this require written permission from the Parks and Recreation Commission.
2. Research that proposes to introduce non-native plants, vertebrates, invertebrates, or microorganisms to any terrestrial or aquatic community will not be allowed without a plan to contain the species or eradicate them upon completion of the project. Exceptions include USDA approved biological control agents.
3. Access to all parts of the preserve with vehicles or other large equipment will not be allowed. Destruction of vegetation to access parts of the preserve or establish research plots will not be allowed. After hour access to the preserve can be arranged to accommodate research needs. The preserve is open to the public and will not be closed to conduct research.
4. The Ott Biological Preserve is a public place for research, education, and enjoyment of the environment. Therefore, research that negatively affects the aesthetics and the public's enjoyment of the preserve will not be approved. Aesthetics is a highly subjective judgment and proposals will be reviewed on a case by case basis.
5. It is the responsibility of the researcher proposing a study to obtain all necessary state and federal permits. Research proposals without proper documentation of permits will not be approved.
6. All research at Ott Biological Preserve is conducted "at your own risk." The Calhoun County Parks and Recreation Commission and the Calhoun County Board of Commissioners are not responsible for any injury or bodily harm to researchers, students, field crew members, or volunteers while they are conducting research on the preserve. Nor are they responsible for any loss of damage to property or equipment that is used while conducting research. The Ott is not responsible for missing or damaged equipment left unattended overnight. Proof of insurance is not required as part of the research proposal, but all claims for injury or property damage should be sent to a researcher's personal or institutional policies.

Proposal Process

A brief research proposal will be required for approval before research at Ott Biological Preserve can commence. There is no annual deadline for research proposals, but they should be submitted well in advance of proposed start date for review by the Parks and Recreation Commission. In general, 30 – 60 days should be sufficient for most proposals, but more time should be given for complex and logistically challenging research. There is no standard format for proposals, but they should include the information listed below. Research proposals receiving grant funding from agencies, foundations, or other sources will usually meet these requirements with few modifications.

1. Research proposal title

2. Name of principle investigator and collaborators along with contact information and affiliations
3. Detailed, but concise, project description including background information, methodology, and expected results
4. Map of preserve with areas of proposed research indicated
5. Length of study and access needs
6. Special equipment, or financial assistance requested
7. Plan for sharing results with students, volunteers, or the general public and willingness to have research directly incorporated into educational programming

The Commission with not charge a fee for research conducted at Ott Biological Preserve, but financial partnerships that support both research and the preserve are encouraged. Preserve staff are willing to assist in grant writing and obtaining research funding, especially when consulted early in the proposal process.

Upon completion of a research project, the Parks and Recreation Commission will be provided with a hard or electronic copy, ideally both, of all research reports, thesis and dissertations, peer-reviewed journal articles, and other publications produced from data collected at the preserve.
Proposals should be submitted to the following location in hard copy or electronic format:

Calhoun County Parks Department
315 W. Green Street
Marshall, MI 49068
269-781-0782
iault@calhouncountymi.gov

ENVIRONMENTAL EDUCATION

Vision

The Ott Biological Preserve's mission statement encourages environmental education and scientific research. The preserve has a long history of associations with educational institutions. The Ott was established in part by Edward A. Brigham, a teacher in Battle Creek. Later, the preserve was affiliated with Battle Creek College and, later yet with Albion College. Our vision is to provide environmental education to the public, including: K-12 students, undergraduate and graduate students, volunteers and visitors at the preserve, citizen scientists, and interested life-long learners of all ages and backgrounds. The goal is to make the Ott Biological Preserve into an environmental education hub serving this region.

Educational Programming

A formal educational program does not presently exist for the Ott, but the use of the Ott for such purposes is encouraged. Relationships with area K-12 school districts, as well as post-secondary training programs, both undergraduate and graduate, are encouraged.

Citizen Science

Citizen science refers to research that involves a network of non-scientist volunteers in making and reporting observations and measurements, or otherwise collecting data. These networks assist scientists

in conducting research as well as promoting public engagement with research and science in general. Citizen scientists can include students, families, preserve volunteers and visitors, and amateur experts.

Connections with Scientists

One of the most enriching and rewarding learning experiences students and the public can have is through direct connection with scientists while conducting authentic research. Ecological and environmental research is encouraged at the Ott and scientists proposing a study should incorporate some form of student or public education into their proposal.

PUBLIC USE

This section describes the recreational infrastructure that the Calhoun County Parks Commission is responsible for and communications and safety tools available to manage the Preserve. The Calhoun County Parks Commission actively supports the public use and enjoyment of the Ott and its natural resources. The Commission realizes that there are many user groups and stakeholders and works diligently to resolve conflicts to promote the long-term sustainability for future generations.

The North Country National Scenic Trail

On March 5, 1980, Congress passed legislation authorizing the North Country National Scenic Trail, culminating efforts that began even before the National Trails System Act of 1968, which established the Appalachian and Pacific Crest National Scenic Trails as the nation's first. The North Country Trail (NCT) wanders more than 4600 miles across the rugged northern tier of the United States passing through 8 states.

The National Park Service (NPS) administers the North Country National Scenic Trail, providing management oversight to the entire trail by working with the federal agencies, state and local governments, private organizations, landowners and land users and providing guidance to North Country Trail Association (NCTA) as a partner.

The NPS provides funding for trail projects, planning and decisions on trail routing, trail tools, supplies and signage for volunteers and trail certification guidelines.

The North Country Trail wanders more than 1,150 miles through the State of Michigan passing through Calhoun County where the trail winds almost two miles through the Ott Preserve.

The Chief Noonday Chapter of the NCTA is the group that voluntarily maintains the North Country Trail through Barry, Calhoun and Kalamazoo counties. This group actively maintains the NCT through the Ott Preserve. The Chapter maintains the NCT to the standards outlined in "The North Country National Scenic Trail: Handbook for Trail Design, Construction and Maintenance." This document lists several criteria regarding how to maintain the trail and the area around the trail.

The section of the NCT through the Ott Preserve is classified as 'semi-primitive' and requires the trail be maintained to the following standards (taken from Figure 1 of the handbook):

- 18" to 28" walking width (hiking and accessibility segments respectively)
- 12" clearing width to either side (free of brush and brambles)
- 8' clearing height (free of low-hanging branches)

- 15°to 12° maximum sustained slope (hiking and accessibility segments respectively)

Calhoun County Trailway

The Calhoun County Trailway is over 5 ½ miles long with almost two miles of the trail located along the north and east perimeter of the Ott Biological Preserve. Although the Trailway is situated within the Preserve, it is considered a separate park with its own maintenance and management plan. For questions pertaining to the Trailway, The Calhoun County Trailway Plan should be referenced.

Its proximity to the Ott poses potential user conflicts since each park has both similar and dissimilar visitors. The key difference between the two parks is the acceptance of the use of bicycles on the Trailway, which are not allowed on the Ott's footpaths.

Park users of the Calhoun County Trailway are encouraged to explore the Ott Biological Preserve as long as they do not bring their bicycles into the Preserve. The Arlington Road entrance has a bicycle rack that can be used for those wishing to explore the Ott Biological Preserve on foot.

Ott Preserve Trails

Trails within the Ott Biological Preserve are shown on maps at each entrance. Users are expected to stay on the trails so as not to disturb the rare and endangered plants and animals that call the Ott home. Trails in the Ott should be maintained to the same standards as those used for maintenance of the North Country Trail (see above for specifications.)

A trail map is located in Appendix C.

Boardwalks and Bridge

Within the Ott there are two boardwalks located toward the north end of the park. These boardwalks were installed in 1999 as part of a $350,000 grant that was received for the Michigan Department of Natural Resources. Dennis Randolph, Managing Director of the Calhoun County Community Development Department was the visionary behind the project and Annette Chapman, Parks and Recreation Director wrote the grants to fund the project.

Figure 19: Historic bridge near the outlet of Brigham Lake.

The boardwalk that is located to the northwest of Brigham Lake is 99 feet long and is currently in fair condition. The other boardwalk is located to the southwest of Brigham Lake and is approximately 566 feet in length. This boardwalk is unique in that it has an historic bridge installed in the middle of it. The 28 foot bridge was built in 1885 and is known as a bedstead bridge because of its resemblance to a bed headboard.

The historic bridge was restored by Vern Mesler an instructor at Lansing Community College and retired steel fabricator and his crew over a period of three months. In September of 1999 Midwest Helicopters from Chicago airlifted the bridge the half mile from the Arlington Road parking lot to its resting place now. The historic bridge is in good condition and the boardwalk is in fair condition.

Park Rules

The public is encouraged to walk the trails, view the wildlife, and learn about nature at the Ott, but some rules are necessary to maintain the quality of the Preserve's natural resources and a safe and enjoyable experience for all visitors. The complete list of rules can be found on the Calhoun County website and in Appendix E of this document. However the rules listed below are specific to this site:

- No fishing or hunting
- Do not remove animals or vegetation from the park
- Stay on the trails
- No bicycle or vehicular traffic allowed
- Please remember to only take pictures and leave footprints
- The park hours are from 8:00am to 9:00pm or dusk daily.

A park watch hotline has been established for users to report undesirable activities and/or safety issues by calling (269) 781-0733.

Management Tools

A wide variety of options can be employed to address multiple-use conflicts. For example, the following techniques can be used to overcome conflict-related problems, while striving to use the least intrusive measures to maintain the naturalness of the Ott's unique setting:

- signage
- education
- meeting with user groups
- expanding facilities
- police or ranger patrols
- enforcement of regulations
- brochures articles in newsletters or local newspapers
- volunteer trail patrols
- partial closings

Trespass and Security

The Ott Biological Preserve exists within an urban landscape with varied uses of the surrounding lands. Therefore, there is a need to demarcate the legal boundary and prevent unlawful trespass and inappropriate activities from occurring on park lands. A perimeter fence would establish the boundary and prevent trespassing, but it is not a realistic option for several reasons.

From a logistical standpoint, the cost and challenges of constructing a secure fence around all 298 acres through a variety of habitats and ground conditions would be immense. Also, a perimeter fence would limit wildlife movement and further isolate the plants and animals in the park. Although fencing the entire perimeter will not work, there are many benefits to fencing placed in strategic locations on the park's boundary.

Currently there is a chain link fence running along the power lines on the west side of the park and along the south end and portions of the park adjacent to Peck Road. The Arlington Road parking lot and Jameson Ave parking lot also split-rail fencing that prevents vehicle access to the park. These measures have been taken to prevent the use of off-road vehicles in the park which are prohibited.

Outdoor lighting is provided in the parking areas only.

Signage and Communications

Signage and communications occurs in four ways at the time this plan was written.

1. Maps, QR codes for smart phones, rules, and other items of interest are posted at the entrance to the Ott Biological Preserve in the Jameson Road and Arlington Road parking lots.
2. Information may be found at the Calhoun County website where park information is listed under the Michigan State University Extension page and on the Road Department page. Plans are underway to move the inconsistent information to a newly created Park Department page.
3. The Parks Department communicates with the public through social media. There are Facebook pages for Calhoun County Parks, Historic Bridge Park, Kimball Pines, and the Ott Biological Preserve. The Calhoun County Trailway Alliance also has a page that promotes the Trailway. This type of media is used to share information about events, park experiences, and other items that may be of interest to this segment of the population that has liked the pages.
4. Finally, a park watch hotline has been established for users to report undesirable activities and/or safety issues by calling (269) 781-0733. The hotline is anonymous, but users have the option to leave information to receive a follow up call.

Signage can be a way to teach the public about nature on self-guided walks and current plans call for increased signage along the trails to not only mark the trail, but to identify trees, flowers, or provide natural history information. However, excessive signage can also distract visitors from the natural experience they came to enjoy. Well-designed signage can be expensive, is susceptible to vandalism and requires maintenance. Therefore, any interpretive signage needs to be justified, installed properly, and carefully designed to blend with the natural environment.

Park Accessibility

Standards issued under the Architectural Barriers Act (ABA) apply to facilities designed, built, altered, or leased with certain federal funds. Passed in 1968, the ABA is one of the first laws to address access to the built environment. The law applies to federal buildings, including post offices, social security offices, federal courthouses and prisons, and national parks. Coverage is limited to those funding programs that give the federal agency awarding grants or loans the authority to establish facility standards.

Achieving accessibility in outdoor environments has long been a challenge and constraints posed by the terrain in the Ott Biological Preserve, the degree of potential development, construction practices and materials, and other factors have made accessibility an issue.

A comprehensive list to learn about accessible trail and greenway design, new projects, training opportunities, legal issues, and proposed federal guidelines can be found at the American Trails website (link provided in Appendix A.)

The Ott Biological Preserve is designed to be a hands-on natural encounter where the user experiences nature up close. The trails in the Preserve are not manicured and vary in width while winding through the park on hilly terrain. Therefore, parts of the park are difficult to traverse and almost impossible to conform to guidelines under the Architectural Barriers Act (ABA) for outdoor developed areas.

PLAN IMPLEMENTATION

This plan is designed to offer guidance and to a provide history for future decision making regarding the Ott Biological Preserve. It should be amended as necessary and updated every five years. The goal of the plan is to provide the tools for the perpetual enjoyment of the Ott Biological Preserve for future generations.

Staff & Oversite

The Ott Biological Preserve is owned by the people of Calhoun County and managed by the Calhoun County Board of Commissioners and under the direction of the Parks and Recreation Commission. The Community Development Department is responsible for maintaining the Preserve. The department has limited resources and relies upon volunteer work to achieve much of the maintenance required in this park.

Staff includes one Educator that works .4 FTE per week and one Maintenance Mechanic that works .5 per week in all parks for Calhoun County. Due to limited staff, volunteers are utilized whenever possible. Partnerships with the North County Trail Chief Noonday Chapter, the Thirty-Seventh Judicial Circuit Family Division Juvenile Services, Calhoun County Juvenile Home, and other volunteer groups for regular maintenance and for large one-time projects. The Community Development Department coordinates all of these groups and projects.

Maintenance Plan

There is a master maintenance plan that includes an inventory of all of the park assets and a schedule for maintaining them. This should be referenced for the day to day activities for park maintenance.

Park Infrastructure

To maintain a safe and enjoyable destination for visitors, the buildings and grounds of the Ott Preserve require routine care and maintenance. The Ott Preserve's facilities and infrastructure include:

Park Amenity	Condition/ yr. installed	Timeline for Improvement
Arlington Road Parking Lot *	Fair	2017 - Crack seal ($3,000 - $4,000)
	Fair	2018 - Chip Seal ($10,000 - $20,000)
* numbers provided by road dept.	New	2027 - HMA ($30,000 - $40,000)
Jameson Road Parking Lot*	Fair	2017 - Crack seal ($5,000 - $6,000)
	Fair	2018 - Chip Seal ($18,000 - $36,000)
* numbers provided by road dept.	New	2027 - HMA ($39,000 - $50,000)
Arlington Road Split rail fencing	2016/new	Inspect annually and repair as needed
Jameson Road Split rail fencing	2016/new	Inspect annually and repair as needed
Chain link fence on west side or park	Good	Inspect annually and repair as needed
North boardwalk	1997/good	Inspect annually and repair as needed
South boardwalk	1997/good	Inspect annually and repair as needed
Historic Bridge	1997/good	Inspect annually and repair as needed
Jameson & Arlington Kiosks	Good	Inspect annually and repair as needed
Park wayfinding signs	Fair	Inspect annually and repair as needed
		Create new signs and install when funding is available
Exterior trash cans	2015/new	Inspect annually
Benches	Poor	Replace as soon as possible
Bike Rack	2015/new	Inspect Annually

Stakeholder Input

When the draft of the Ott Biological Preserve Management and Maintenance plan was completed, copies were forwarded to nearby stakeholders for comment. This is an alphabetical list of who was contacted:

1. Albion College
2. Audubon Society
3. Battle Creek Friends Church
4. Battle Creek Parks and Recreation
5. Calhoun Conservation District
6. Calhoun County Trailway Alliance
7. Calhoun Intermediate School District
8. Chin Baptist Church
9. Doris Klaussen Development Center
10. Emmett Charter Township
11. Harper Creek Community Schools
12. Lakeside Apartments
13. Marshall Community Credit Union
14. Michigan Department of Natural Resources

15. Neighbors
16. North County Trail
17. North County Trail – Chief Noonday Chapter
18. Oak Forest Home Park
19. Pine Knoll Apartments
20. Southwest Michigan Land Conservancy

These businesses, organizations and neighbors had two weeks to provide feedback to the committee in three ways. They were given an opportunity to email or phone the subcommittee with comments or they had an option to attend a public meeting held on March __, 2016.

Action Steps

Below is a list of items to be completed.

1) Schedule volunteer work days and tasks
2) Replace park signage at Arlington entrance
3) Replace/repair benches along tail system
4) Develop and install wayfinding system for Ott visitors
5) Develop informative and interpretive signage for Ott visitors
6) Develop volunteer plan
7) Add benches and boardwalks along lakes and fen
8) Develop a park ranger program to incorporate a full-time seasonal staff person
9) Seek partnerships for invasive species management
10) Develop oak restoration strategy with partners

Acknowledgements

There were many individuals who assisted with the development of this plan and provided expertise on the future of the Ott Biological Preserve.

The Ott Biological Preserve Workgroup spent many hours meeting, researching and writing the content of this document. Workgroup members included:

- Bill Comai, Calhoun County Parks and Recreation Member & Friend of the Ott Preserve
- Brian Huggett, Executive Director, Potawatomi Resource Conservation & Development Council
- Christine Kosmowski, Calhoun County Water Resources Commissioner
- Allyn Miller, Calhoun County Parks and Recreation Commissioner
- Ron Sootsman, Calhoun County Parks and Recreation Commissioner

Other professional individuals that were consulted:

- Dr. J. Dan Skean, Jr., Department of Biology, Albion College
- Anna K. Bowen, Department of Biology, Miami University
- Sara Schaefer, Wildlife Specialist, Department of Natural Resources
- David Borneman, Owner, Restoring Nature with Fire

Calhoun County Staff:

- Ingrid Ault, Community Development Educator, MSU Extension
- Brent Thelen, GIS Coordinator

Calhoun County Commissioners (2015-2016 term)
District 1 - Kathy Sue Dunn
District 2 – Carla C. Reynolds
District 3 - Jim Haadsma
District 4 - Steve Frisbie
District 5 - Derek King
District 6 - Blaine VanSickle
District 7 – Michael Bearman

Parks and Recreation Commissioners
Derek King, Chair of Parks and Recreation Commission & Calhoun County Commissioner*
Annette Chapman, Vice Chair and with the Battle Creek Community Foundation
Dr. Bill Comai, Member of Friends of the Ott
Jesse Jacox, Emmett Township Trustee
Lindsey Johnson, Member at Large
Christine Kosmowski, Calhoun County Water Resources Commissioner*
Allyn Miller, Emmett Township Planning Commission
John Rodwan, Environmental Director, Nottawaseppi Huron Band of the Potawatomi
Ron Sootsman, President, Calhoun County Trailway Alliance
Blaine VanSickle, Chair of County Planning Commission & Calhoun County Commissioner *
* positions specified by statute

This plan would not have been completed without help from Albion College and the Potawatomi Resource Conservation & Development Council. These organizations played a key role in understanding

the plant and animal life that call the Ott Biological Preserve home. Their work documenting the various natural communities and scientific literature has proved invaluable while working on this plan.

Calhoun County is committed to maintaining the land as a preserve to house rare and endangered species for current and future generations. This plan is provided to assure this continues.

Appendix A: Literature Cited

Tift Nature Preserve Management Plan, February 2009, Buffalo Museum of Science (http://www.tifft.org/tifft/images/pdfs/tifft-management-plan.pdf, last accessed 6/21/2016.)

North County National Scenic Trail, A handbook for trail design, construction and maintenance, (https://www.nps.gov/noco/learn/management/ncttrailconstructionmanual1.htm, last accessed 6/21/2016.)

Agreement Regarding Development of Phase 1, Segment 1 of the Calhoun County Trailway, Calhoun County Trailway Maintenance and Management Plan, 2016

Gilbert, W. J. 1954. The Harvey N. Ott Biological Preserve of Albion College. Michigan History 38: 157-167

Site Management Plan for the Ott Biological Preserve, Calhoun County, Michigan, 2003-2008

Hyde, D. 2012. Update of Lee, Y. 2000. Special animal abstract for Mitchell's satyr butterfly (Neonympha mitchellii michellii). Michigan Natural Features Inventory, Lansing, MI. 7 pp.

Cohen, J.G., and M.A. Kost. 2008. Natural community abstract for bog. Michigan Natural Features Inventory, Lansing, MI. 21pp.

Slaughter, B.S. 2009. Natural Community abstract for southern hardwood swamp. Michigan Natural Features Inventory, Lansing, MI. 16pp.

Kost, M.A. 2004. Natural Community abstract for dry-mesic prairie. Michigan Natural Features Inventory, Lansing, MI. 10pp.

Lee, J.G. 2007. Natural Community abstract for dry-mesic southern forest. Michigan Natural Features Inventory, Lansing, MI. 16pp.

Michigan Natural Features Inventory. 1997. Natural Community abstract for prairie fen. Michigan Natural Features Inventory, Lansing, MI. 4pp.

Bowen, A.K.M. and J.D. Skean. 201_. Vascular flora and plant community types of the Ott Biological Preserve, Calhoun County, Michigan. _____.

Michigan Prescribed Fire Council Steering Committee. 2008. Prescribed fire in Michigan-Best Management Practices. White paper. 11pp.

Bergquist, S.G. ca. 1950. The glacial history and development of Michigan. Michigan State College. East Lansing, MI. 12pp.

PRISM Climate Group, Oregon State University, (http://prism.oregonstate.edu, last accessed 6/21/2016.)

United States Department of Agriculture, Web Soil Survey, (http://websoilsurvey.nrcs.usda.gov/, last accessed on 6/21/2016.)

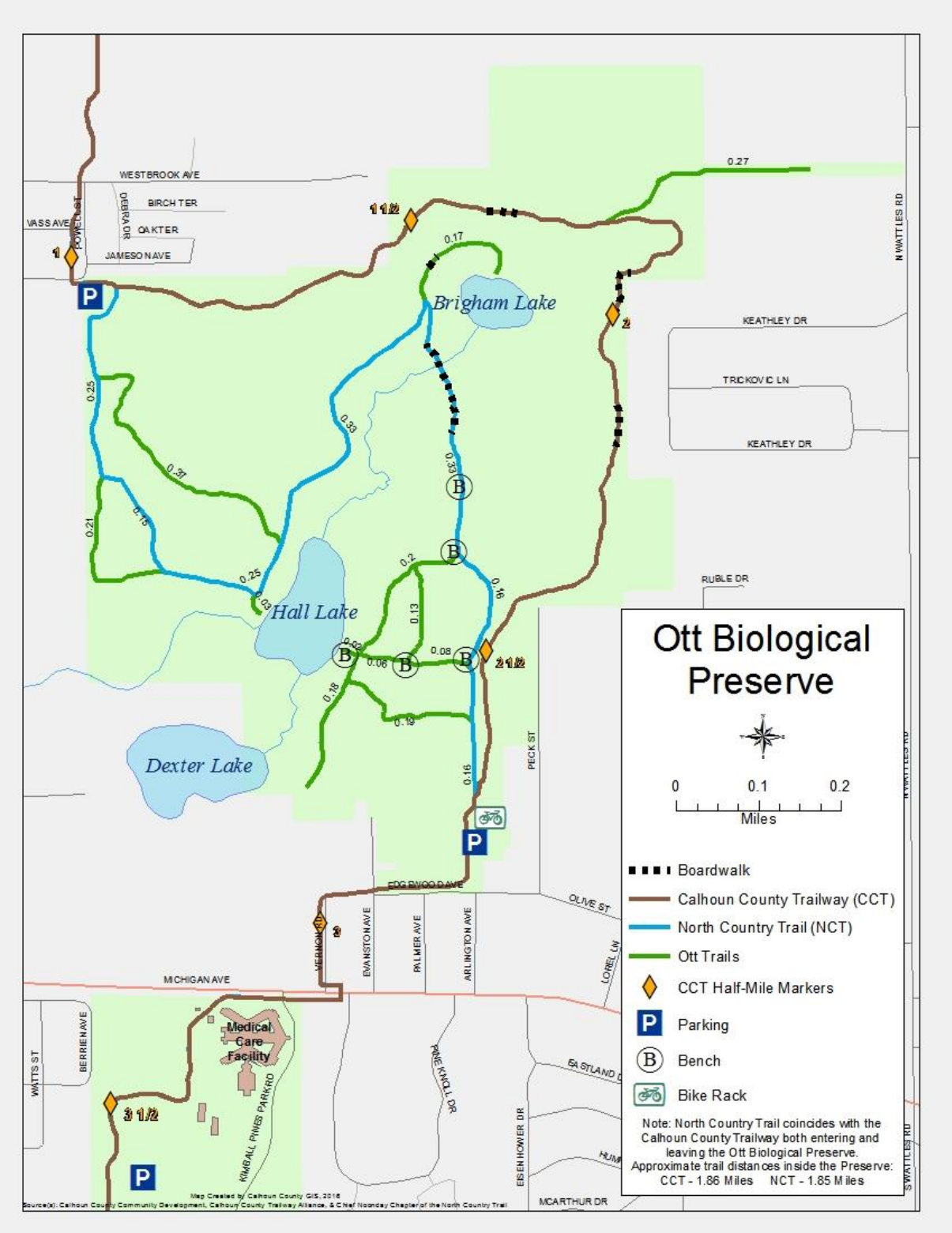
Michigan Natural Features Inventory, Michigan State University, (www.anr.msu.edu\mnfi, last accessed on 6/21/2015.)

Michigan Prescribed Fire Council, Best Management Practices, (http://firecouncil.org/mpfc-resources/mpfc-best-practices/, last accessed on 6/21/2016)

National Trails Training Partnerships, (http://www.americantrails.org/resources/accessible/index.html, last accessed on 6/21/2016.)

Appendix B: Trail Map

Map of the Ott Biological Preserve showing the trail network with approximate distances.



Appendix C: e-Bird Species List

This data was downloaded from the e-Bird website (http://ebird.org/ebird/hotspot/L1482120?yr=all&m=&rank=mrec&hs_sortBy=date&hs_o=desc, last accessed on 3/22/2016 13:20.) Below are the list of bird species logged in the e-Bird database. The data were sorted and downloaded specifically for the Ott Preserve and serves as an observed record of species. The species observed are listed alphabetically below.

- Acadian Flycatcher
- American Crow
- American Goldfinch
- American Redstart
- American Robin
- Baltimore Oriole
- Bank Swallow
- Barn Swallow
- Barred Owl
- Bay-breasted Warbler
- Belted Kingfisher
- Black-and-white Warbler
- Blackburnian Warbler
- Black-capped Chickadee
- Blackpoll Warbler
- Black-throated Blue Warbler
- Black-throated Green Warbler
- Blue Jay
- Blue-gray Gnatcatcher
- Blue-headed Vireo
- Blue-winged Warbler
- Broad-winged Hawk
- Brown Creeper
- Brown Thrasher
- Brown-headed Cowbird
- Canada Goose
- Cape May Warbler
- Carolina Wren
- Cedar Waxwing
- Chestnut-sided Warbler
- Chimney Swift
- Chipping Sparrow
- Cliff Swallow
- Common Gallinule
- Common Grackle
- Common Nighthawk
- Common Yellowthroat
- Cooper's Hawk
- Dark-eyed Junco
- Downy Woodpecker
- Eastern Bluebird
- Eastern Kingbird
- Eastern Phoebe
- Eastern Towhee
- Eastern Wood-Pewee
- European Starling
- Field Sparrow
- Golden-crowned Kinglet
- Gray Catbird
- Gray-cheeked Thrush
- Great Blue Heron
- Great Crested Flycatcher
- Great Horned Owl
- Green Heron
- Hairy Woodpecker
- Hermit Thrush
- Hooded Merganser
- House Finch
- House Sparrow
- House Wren
- Indigo Bunting
- Killdeer
- Least Flycatcher
- Lincoln's Sparrow
- Magnolia Warbler
- Mallard
- Mourning Dove
- Mute Swan
- Nashville Warbler
- Northern Bobwhite
- Northern Cardinal
- Northern Flicker
- Northern Parula
- Northern Rough-winged Swallow
- Northern Waterthrush
- Orchard Oriole
- Osprey
- Ovenbird
- Palm Warbler
- Pied-billed Grebe
- Pileated Woodpecker
- Pine Siskin
- Purple Martin
- Red-bellied Woodpecker
- Red-eyed Vireo
- Red-headed Woodpecker
- Red-tailed Hawk
- Red-winged Blackbird
- Rock Pigeon
- Rose-breasted Grosbeak
- Ruby-crowned Kinglet
- Ruby-throated Hummingbird
- Ruffed Grouse
- Sandhill Crane
- Savannah Sparrow
- Scarlet Tanager
- Song Sparrow
- Spotted Sandpiper
- Swainson's Thrush
- Swamp Sparrow
- Tennessee Warbler
- Tree Swallow
- Trumpeter Swan
- Tufted Titmouse
- Turkey Vulture
- Veery
- Vesper Sparrow
- Warbling Vireo
- White-breasted Nuthatch
- White-crowned Sparrow
- White-throated Sparrow
- Wild Turkey
- Wilson's Warbler
- Wood Duck
- Wood Thrush
- Yellow Warbler
- Yellow-billed Cuckoo
- Yellow-rumped Warbler
- Yellow-throated Vireo

Appendix D: Michigan Herpetological Database List

These data are provided by MIHerpAtlas (www.MIHerpAtlas.org) coordinated by the Michigan Department of Natural Resources, administered by Herpetological Resource and Management, and made possible through our network of contributors and partners. This data is current through 2014.

Common Name	Scientific Name	# of Sightings
Eastern American Toad	Bufo americanus americanus	9
Blanding's Turtle	Emydoidea blandingii	2
Bullfrog	Rana catesbeiana	3
Blue Racer	Coluber constrictor foxi	1
Northern Brown Snake	Storeria dekayi dekayi	1
Eastern Musk Turtle	Sternotherus odoratus	3
Gray Treefrog	Hyla chrysocelis or versicolor	5
Eastern Box Turtle	Terrapene carolina carolina	3
Eastern Garter Snake	Thamnophis sirtalis sirtalis	6
Eastern Hog-nosed Snake	Heterodon platirhinos	1
Eastern Massasauga Rattlesnake	Sistrurus catenatus catenatus	3
Eastern Gray Treefrog	Hyla versicolor	9
Eastern Tiger Salamander	Ambystoma tigrinum tigrinum	1
Green Frog	Rana clamitans melanota	12
Mink Frog	Rana septentrionalis	1
Northern Map Turtle	Graptemys geographica	13
Northern Spring Peeper	Pseudacris crucifer crucifer	14
Northern Water Snake	Nerodia sipedon sipedon	2
Midland Painted Turtle	Chrysemys picta marginata	8
Queen Snake	Regina septemvittata	1
Northern Red-bellied Snake	Storeria occipitomaculata occipitomaculata	1
Eastern Snapping Turtle	Chelydra serpentina serpentina	15
Eastern Spiny Softshell Turtle	Apalone spinifera spinifera	10
Western Chorus Frog	Pseudacris triseriata triseriata	7
Wood Frog	Rana sylvatica	6

Appendix E: Calhoun County Parks Rules

Calhoun County Parks - Rules and Regulations

Authority

The Calhoun County Parks and Recreation Commission ("Commission"), with the approval of the Calhoun County Board of Commissioners ("Board of Commissioners"), does hereby establishes rules and regulations for county parks and facilities under the jurisdiction of the Commission as permitted by MCL 46.364(1), as amended, to further provide that violations of such rules and regulations shall be a misdemeanor punishable by a fine of not more than $100.00 and costs of prosecution or by imprisonment for not more than 90 days, or both, as authorized by MCL 46.364(3), and to further authorize the enforcement of these rules and regulations by employees, designees, or agents of the Commission and/or Calhoun County. Any violation using a motorized vehicle as defined herein on the Trailway in violation of these rules shall also be a municipal civil infraction subject to a civil fine of $500.00.

Definitions

"Board of Commissioners" shall mean the Calhoun County Board of Commissioners.

"Commission" shall mean the Calhoun County Parks and Recreation Commission.

"Parks" shall mean Historic Bridge Park, Kimball Pines Park, Ott Biological Preserve, the Trailway which connects Historic Bridge Park, Kimball Pines Park, and Ott Preserve, and Riverside Park.

"Person" or "Persons" shall mean individuals, male or female, singular or plural: firms, corporations, or any group or gathering of individuals.

"Motorized vehicle" shall mean any licensed and titled motor vehicle, all-terrain vehicle ("ATV") of any sort, motor bike, dirt-bike, golf cart, or other similar vehicle which may or may not be licensed for road use but which can be utilized off paved roads open to the public. Motorized vehicle shall not include motorized wheel chairs of any type.

"Rules" shall mean the rules and amendments thereto, adopted by the Commission and approved by the Board of Commissioners, applicable to all property administered by or under the jurisdiction of the said Commission, including, but not limited to, public park property owned by Calhoun County.

"Trailway" shall mean the Trailway running from the corner of Raymond Road and Emmett Street in the north to Historic Bridge Park in the South and all areas encompassed by the easement(s) associated with said Trailway.

Article I-Park Land Access

Section 1 – General Public

a) Calhoun County Parks are open to the general public for use subject to the limitations set forth herein.

b) Any group may use certain designated park facilities to the exclusion of others by making application, depositing a fee as set forth in the attached fee schedule (Exhibit A), and being granted a permit by the Commission as set forth herein.

Section 2 – Hours of Operation

a) No person shall remain upon parks property between 9 p.m. and 8 a.m. Said hours may be extended upon approval of the Commission. It shall be unlawful for any person to enter parks or waters, which have been designated as closed for public use or entry.

Section 3 – Unlawful Obstruction

a) No person, firm, or corporation shall by force, threats, intimidation, unlawful fencing, enclosing or by other means, prevent or obstruct any person from entering, leaving or making full use of any parks.

Article II – Conduct on Park Property

Section 1 – Permit Reservation

a) The pavilion at Historic Bridge Park can be reserved for activities using an application form furnished by the Commission and attached hereto as Exhibit B. The County Administrator/Controller or her designee is authorized to collect any fees related to the application.

b) Each application shall be accompanied by a deposit as outlined on the current fee schedule of the Commission.

c) A Special Use Permit in the form attached hereto as Exhibit C can be applied for through the Commission for uses that are not permitted within the current adopted parks rules and regulation. A non-refundable application fee is required as set forth on Exhibit A.

d) An additional reasonable special permit fee, depending on the scope of the requested activities, may be charged by the Commission.

e) Nothing contained herein shall exempt the users of reserved facilities from full compliance with these park rules.

Section 2 – Playgrounds

a) No person shall fail to exercise supervisory responsibility for minor children entrusted to their care. Children shall be under the immediate supervision of a responsible adult at all times.

b) Park patrons are encouraged to report any broken or defective playground equipment to the Commission immediately.

c) Use of playground equipment shall be appropriate for the ages recommended by the manufacturer.

Section 3 – Vandalism and Destruction of Property

a) No person shall willfully destroy, deface, alter, change or remove any monument, stone marker, benchmark, stake, post or blaze, marking or designating any boundary line, survey line, or reference point.

b) No person shall cut, break, mark upon or otherwise injure any building, equipment, bridge, drain, wall, fountain, lamppost, trail feature, gate, hedge, or other structure.

c) No person shall deface, destroy, or remove any placard, notice or sign, whether permanent or temporary, posted or exhibited within or upon park property.

d) No person shall appropriate, excavate, injure or destroy any historical ruin or pre-historical ruin or any object of antiquity, without permission of the Commission.

Section 4 – Destruction of Natural Surroundings

a) No person shall cut, remove, or destroy any tree, sapling, seedling, bush or shrub, whether alive or dead, or chip, blaze, box, girdle, trim or otherwise deface or injure any tree or shrub, or pick, gather, uproot, remove or destroy any flower, plant or grass.

b) No person shall remove or cause to be removed any sod, earth, humus, peat, boulders, gravel or sand, without prior written permission of the Commission.

c) All maintenance of the park and park facilities, including the removal of invasive species, shall be by authorized Calhoun County employees or Commission volunteers.

Section 5 – Fires

a) No person shall willfully set or cause to be set on fire any tree, woodland, brushland, grassland, or meadow located in the parks.

b) No person shall build any fire except within receptacles designated for such purposes. No open fires are allowed in any park.

c) No person shall drop, throw or scatter lighted matches, burning cigars, cigarettes, tobacco paper or other flammable material within any park.

d) No person shall leave any fire unattended. Park users shall completely extinguish all fires in grilles, including embers, prior to leaving the park.

Section 6 – Hunting, Fishing, Trapping

No person shall hunt, trap, catch, wound, kill or treat cruelly, attempt to trap, catch, wound or kill any bird or animal, molest or rob any nest of any bird or lair, den or burrow of any animal in or upon any park. Fishing will be permitted in accordance with the laws of the Department of Natural Resources of the State of Michigan in such areas designated for such purposes.

Section 7 – Fireworks

No person shall fire, discharge, or have in his/her possession any firecracker, rocket, sparkler, or other fireworks or any substance of an explosive or dangerous nature in the parks.

Section 8 – Personal Conduct

a) It shall be unlawful for any person to be under the influence of intoxicants, controlled substances, narcotics, or other mind affecting drugs, or to engage in any violent, abusive, loud, boisterous, vulgar, lewd, wanton, obscene or otherwise disorderly conduct tending to create a breach of the peace, or disturb or annoy others, while in the parks.

b) It shall be unlawful to conduct or to participate in any form of gambling, lottery, or game of chance in the parks except as permitted by state law and approved by the Commission.

c) It shall be unlawful for any person to peddle or solicit business of any nature whatever, or to distribute handbills, or other advertising matter, unless first authorized in writing by the Commission.

d) No person shall have in their possession any intoxicating beverage while in or upon the parks unless they have obtained a Special Use permit issued by the Commission.

Section 9 – Noise Pollution

It shall be unlawful to use a loudspeaker, public address system or sound amplifying equipment of any kind without proper written permission; or to operate a motor, motorboat, motor vehicle, radio, television, or any device in a manner that produces excessive noise.

Section 10 – Littering and Pollution of Waters

a) It shall be unlawful to discard, to deposit refuse of any kind or nature except by placing said refuse in containers provided for such purpose. There will be no littering of the ground in the parks.

b) It shall be unlawful to throw, lay, drop, or discharge into or leave in waters any substance, matter or thing, liquid or solid, which may or shall result in the pollution of said waters.

c) It shall be unlawful to deposit refuse or waste material which has originated outside the parks in receptacles provided for county park users; to set fire to contents of a refuse basket or trash container, or to place or burn garbage in a fire ring or stove.

Section 11 – Contraband

All game animals, fowl, birds, fish and other aquatic life, hunted, killed, taken or destroyed, bought, sold, bartered or had in possession, contrary to any of the provisions hereof, shall be declared to be contraband and shall be turned over to the State of Michigan Department of Natural Resources for disposal.

Article III - Fees and Charges

It shall be unlawful:

a) To use any facility, land, portion of the parks, or area for which a fee and charge has been established by the Commission without payment of such fee or charge.

b) For any person, group, or organization to occupy, use or fail to vacate any facility, building, land area or equipment for which a permit has been granted to another person, group or organization.

Article IV – Swimming, Bathing, and Wading

No person shall swim, bathe, or wade in any lake, pond, or other watercourse located within the parks.

Article V – Animals and Pets

a) Pets are permitted in the parks unless posted otherwise. Hooved animals are not permitted in the park without a Special Use Permit.

b) Pets are permitted on the trailway but must be kept within the surfaced area of the trail at all times.

c) Pets shall be kept on a leash no greater than 6 feet in length, under the immediate and continuous control of a competent person and shall not be allowed to disturb or annoy park users or wildlife.

d) Pets are not to be left unattended at any time or for any reason while in the parks.

e) The person who owns or is in charge of any pet shall immediately remove and dispose of all droppings deposited by such animal by any sanitary method and place in an appropriate receptacle in the parks or remove the waste from the parks.

f) It shall be unlawful to torture, ill-treat or neglect any animal or fowl while in the parks.

g) Owners of domestic animals shall be held responsible for the presence of their animal in any of the County parks.

h) Any animal found not in the possession of, or under the immediate control or supervision of its owner or the owner's agent, or any animal creating a nuisance or disturbance, may be removed from the park.

Article VI – Traffic Control

Section 1 – State Laws

All motor driven vehicles (as defined by State law) operated on park roadways or parking lots shall be subject to the laws of the State of Michigan as set forth in the Michigan Motor Vehicle Code MCL 257.1 et seq, as amended. This act is hereby adopted in its entirety and made part and incorporated herein by reference.

Section 2 – Parking in Prohibited Areas

It shall be unlawful for a motor vehicle operator to stop, stand, or park said vehicles:

a) In any place marked as a passenger or loading zone, other than for the expeditious loading or unloading of passengers or for the unloading and delivery or pickup and loading of materials.

b) Upon any roadway or in any parking area in such manner as to form an obstruction to traffic thereon.

c) In any place marked for use by the handicapped, except when by permanent or temporary permit, properly displayed, and authorized by a legally recognized regulatory authority.

Section 3 – Motorized Vehicles

It shall be unlawful for any person to:

a) Operate a motorized vehicle of any kind or nature except on designated roads and parking areas. Specifically, motorized trail bikes, snowmobiles, ATVs and similar vehicles are prohibited from operating on parks property and on the trailway.

b) Operate, ride, or propel any motorized vehicle on park premises unless duly licensed to be operated on the highways of the State of Michigan.

c) Operate a motor driven vehicle on any park road at a speed exceeding 15 miles per hour or at any speed greater than that posted.

d) Violate provisions of the Michigan Motor Vehicle Code MCL 257.1 et seq, as amended.

Section 4 – Non-Motorized Vehicles

Bicycles shall be operated as closely to the right hand side of the path, trail or roadway as conditions permit and shall be ridden single file. It shall be unlawful:

a) To operate a bicycle in a manner that endangers pedestrians, one's self and other bicyclists.

b) To carry any person upon a bicycle handlebar or frame, or for any person to so ride upon such a bicycle.

c) It shall be unlawful to operate a bicycle in the parks between sunset and sunrise.

Article VII – Commercial Activities, Peddling and Soliciting

It shall be unlawful for any person to operate a business, peddle, or solicit business of any nature whatever, or to distribute handbills, or other advertising matter, to post unauthorized signs on any lands, waters, structures, or property administered by or under the jurisdiction of the Commission, or to use such lands, waters, structures or property unless first authorized in writing by the Commission or its authorized agent. If approval is received from the Commission to operate a business (wholly or in part) within the boundaries of a park, a permit will be issued. To receive a permit, the business MUST show proof of insurance and pay established fee designated by the Commission for said permit.

Article VIII – Hindering and Resisting Trustee Employees

No person shall interfere with or hinder any Calhoun County employee, authorized volunteer, or agent in the discharge of his/her official duties; or fail or refuse to obey any lawful command of any County/Commission employee or agent.

Article IX – Impersonation of Park Employees

No person shall impersonate any employee or contracted employee of the County/Commission for any reason whatsoever.

Article X – Emergency Powers

Nothing in these rules shall:

a) Prohibit or hinder any County/Commission employee, agent or peace officer from performing his or her official duties.

b) Prohibit the Commission, subject to approval by the County Board, from establishing emergency rules required to protect the health, welfare and safety of park visitors; to protect property; to maintain order.

Article XI – Enforcement and Penalties

Section 1 – Fines and Enforcement

a) Any person who violates the Rules and Regulations of the Calhoun County Parks is guilty of a misdemeanor punishable by a fine of not more than $100.00 and costs of prosecution or by imprisonment for not more than 90 days or both.

b) The trailway is a recreational trailway within the meaning of MCL 46.354(4) and the operation of a motorized vehicle on the trailway in violation of these park rules shall constitute a municipal civil infraction. A civil fine shall not exceed the maximum amount of a $500.00

c) Persons violating any of the above provisions may also be evicted from said park or parkland upon the day of the offense and for up to a year if deemed necessary by the Commission.

Article XII – Separability

The provisions of these rules are separable, and the invalidity of any phrase, clause or part of these rules shall not affect the validity or effectiveness of the remainder or the rules.

Adopted by the Calhoun County Parks and Recreation Commission on May 7, 2015

Approved by the Calhoun County Board of Commissioners on May 7, 2015

Appendix F: Calhoun County Parks Map